Hoshizaki America, Inc.

Modular Crescent Cuber

Models
KM-1601MRH/3

"A Superior Degree of Reliability"

www.hoshizaki.com

SERVICE MANUAL

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IMPORTANT

Only qualified service technicians should install, service, and maintain the icemaker. No service or maintenance should be undertaken until the technician has thoroughly read this Service Manual. Failure to service and maintain the equipment in accordance with this manual may adversely affect safety, performance, component life, and warranty coverage.

Hoshizaki provides this manual primarily to assist qualified service technicians in the service and maintenance of the icemaker.

Should the reader have any questions or concerns which have not been satisfactorily addressed, please call, write, or send an e-mail message to the Hoshizaki Technical Support Department for assistance.

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NOTE: To expedite assistance, all correspondence/communication MUST include the following information:

- Model Number _____
- Serial Number _____
- Complete and detailed explanation of the problem.

IMPORTANT

This manual should be read carefully before the icemaker is serviced or maintenance operations are performed. Only qualified service technicians should install, service, and maintain the icemaker. Read the warnings contained in this booklet carefully as they give important information regarding safety. Please retain this booklet for any further reference that may be necessary.

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Important Safety Information

Throughout this manual, notices appear to bring your attention to situations which could result in death, serious injury, or damage to the unit.

⚠ WARNING **Indicates a hazardous situation which could result in death or serious injury.**

CAUTION **Indicates a situation which could result in damage to the unit.**

IMPORTANT **Indicates important information about the use and care of the unit.**

⚠ WARNING

This icemaker should be destined only to the use for which it has been expressly conceived. Any other use should be considered improper and therefore dangerous. The manufacturer cannot be held responsible for injury or damage resulting from improper, incorrect, and unreasonable use.

To reduce the risk of death, electric shock, serious injury, or fire, follow basic precautions including the following:

- Only qualified service technicians should install, service, and maintain the icemaker.
- Electrical connection must be hard-wired and must meet national, state, and local electrical code requirements. Failure to meet these code requirements could result in death, electric shock, serious injury, fire, or severe damage to equipment.
- This unit requires an independent power supply. See the nameplate for proper voltage and breaker/fuse size. Failure to use a proper breaker or fuse can result in a tripped breaker, blown fuse, or damage to existing wiring. This could lead to heat generation or fire.
- **THE ICEMAKER MUST BE GROUNDED.** Failure to properly ground the icemaker could result in death or serious injury.
- Move the control switch to the "OFF" position and turn off the power supply before servicing. Lockout/Tagout to prevent the power supply from being turned back on inadvertently.
- Do not make any alterations to the unit. Alterations could result in electric shock, injury, fire, or damage to the unit.

Additional Warning for Remote Air-Cooled Model

- **THE REMOTE CONDENSER UNIT MUST BE GROUNDED.** The power supply and ground wire to the remote condenser unit are supplied from the icemaker. Failure to properly ground the remote condenser unit could result in death or serious injury.

I. Specifications

A. Icemaker

1. KM-1601MRH with URC-21F

AC SUPPLY VOLTAGE	208-230/60/1 (3 wire with neutral for 115V)			
AMPERAGE	11.6 A (5 Min. Freeze AT 104°F / WT 80°F)			
MINIMUM CIRCUIT AMPACITY	20 A			
MAXIMUM FUSE SIZE	20 A			
APPROXIMATE ICE PRODUCTION PER 24 HR. lbs./day (kg/day) Reference without *marks	Ambient Temp.(°F)	WATER TEMP. (°F) 50	70	90
	70	*1508 (684)	1483 (673)	1399 (634)
	80	1489 (675)	1450 (658)	1338 (607)
	90	1483 (673)	*1422 (645)	1320 (599)
	100	1449 (657)	1398 (634)	1227 (557)
SHAPE OF ICE	Crescent Cube			
ICE PRODUCTION PER CYCLE	29.8 lbs. (13.5 kg) 1440 pcs.			
APPROXIMATE STORAGE CAPACITY	N/A			
ELECTRIC & WATER CONSUMPTION	90/70°F		70/50°F	
ELECTRIC W (kWH/100 lbs.)	2670(4.5)		2450(3.9)	
WATER gal./24HR (gal./100 lbs.)	263(18.5)		483(32.0)	
EXTERIOR DIMENSIONS (WxDxH)	30" x 27.4" x 41.7" (762 x 695 x 1059 mm)			
EXTERIOR FINISH	Stainless Steel, Galvanized Steel (Rear)			
WEIGHT	Net 259 lbs. (117 kg), Shipping 316 lbs. (143 kg)			
CONNECTIONS - ELECTRIC	Permanent - Connection			
- WATER SUPPLY	Inlet	1/2" FPT		
- DRAIN	Outlet	3/4" FPT		
		3/8" OD Tube		
CUBE CONTROL SYSTEM	Float Switch			
HARVESTING CONTROL SYSTEM	Hot Gas and Water, Thermistor and Timer			
ICE MAKING WATER CONTROL	Timer Controlled. Overflow Pipe			
COOLING WATER CONTROL	N/A			
BIN CONTROL SYSTEM	Thermostat			
COMPRESSOR	Hermetic, Model CS18K6E-PFV			
CONDENSER	Air-Cooled Remote, Condenser Unit URC-21F			
EVAPORATOR	Vertical type, Stainless Steel and Copper			
REFRIGERANT CONTROL	Thermostatic Expansion Valve			
	Condensing Pressure Regulator on URC-21F			
REFRIGERANT CHARGE	R-404A, 24 lb. 4.0 oz. (11,000g)			
	(Icemaker 14 lbs. 8.8 oz. Cond. Unit 9 lb. 11.2 oz.)			
DESIGN PRESSURE	High 467PSIG, Low 230PSIG			
P.C. BOARD CIRCUIT PROTECTION	High Voltage Cut-out (Internal)			
COMPRESSOR PROTECTION	Auto-reset Overload Protector (Internal)			
REFRIGERANT CIRCUIT PROTECTION	Auto-reset High Pressure Control Switch			
LOW WATER PROTECTION	Float Switch			
ACCESSORIES -SUPPLIED	N/A			
-REQUIRED	Ice Dispenser or Ice Storage Bin, Remote Condenser Unit			
OPERATING CONDITIONS	VOLTAGE RANGE			187 - 253 V
	AMBIENT TEMP.			45 -100° F
	WATER SUPPLY TEMP.			45 - 90° F
	WATER SUPPLY PRESSURE			10 - 113 PSIG

Note: We reserve the right to make changes in specifications and design without prior notice.

2. KM-1601MRH with URC-22F

AC SUPPLY VOLTAGE	208-230/60/1 (3 wire with neutral for 115V)			
AMPERAGE	11.6 A (5 Min. Freeze AT 104°F / WT 80°F)			
MINIMUM CIRCUIT AMPACITY	20 A			
MAXIMUM FUSE SIZE	20 A			
APPROXIMATE ICE PRODUCTION	Ambient	WATER TEMP. (°F)		
PER 24 HR.	Temp.(°F)	50	70	90
lbs./day (kg/day)	70	*1493 (677)	1471 (667)	1410 (640)
Reference without *marks	80	1476 (670)	1441 (654)	1364 (619)
	90	1471 (667)	*1417 (643)	1346 (610)
	100	1449 (657)	1400 (635)	1280 (581)
SHAPE OF ICE	Crescent Cube			
ICE PRODUCTION PER CYCLE	27.9 lbs. (12.7 kg) 1440 pcs.			
APPROXIMATE STORAGE CAPACITY	N/A			
ELECTRIC & WATER CONSUMPTION	90/70°F		70/50°F	
ELECTRIC W (kWH/100 lbs.)	2740(4.64)		2590(4.17)	
WATER gal./24HR (gal./100 lbs.)	264(18.6)		521(34.9)	
CEC/CEE TIER LEVEL	2			
ENERGY STAR	YES			
EXTERIOR DIMENSIONS (WxDxH)	30" x 27.4" x 41.7" (762 x 695 x 1059 mm)			
EXTERIOR FINISH	Stainless Steel, Galvanized Steel (Rear)			
WEIGHT	Net 259 lbs. (117 kg), Shipping 316 lbs. (143 kg)			
CONNECTIONS - ELECTRIC	Permanent - Connection			
- WATER SUPPLY	Inlet	1/2" FPT		
- DRAIN	Outlet	3/4" FPT		
		3/8" OD Tube		
CUBE CONTROL SYSTEM	Float Switch			
HARVESTING CONTROL SYSTEM	Hot Gas and Water, Thermistor and Timer			
ICE MAKING WATER CONTROL	Timer Controlled. Overflow Pipe			
COOLING WATER CONTROL	N/A			
BIN CONTROL SYSTEM	Thermostat			
COMPRESSOR	Hermetic, Model CS18K6E-PFV			
CONDENSER	Air-Cooled Remote, Condenser Unit URC-22F			
EVAPORATOR	Vertical type, Stainless Steel and Copper			
REFRIGERANT CONTROL	Thermostatic Expansion Valve			
	Condensing Pressure Regulator on URC-22F			
REFRIGERANT CHARGE (w/URC-22F)	R-404A, 22 lb. 4.3 oz. (10,100g)			
	(Icemaker 14 lbs. 8.8 oz. Cond. Unit 9 lb. 11.2 oz.)			
DESIGN PRESSURE	High 467PSIG, Low 230PSIG			
P.C. BOARD CIRCUIT PROTECTION	High Voltage Cut-out (Internal)			
COMPRESSOR PROTECTION	Auto-reset Overload Protector (Internal)			
REFRIGERANT CIRCUIT PROTECTION	Auto-reset High Pressure Control Switch			
LOW WATER PROTECTION	Float Switch			
ACCESSORIES -SUPPLIED	N/A			
-REQUIRED	Ice Dispenser or Ice Storage Bin, Remote Condenser Unit			
OPERATING CONDITIONS	VOLTAGE RANGE			187 - 253 V
	AMBIENT TEMP.			45 -100° F
	WATER SUPPLY TEMP.			45 - 90° F
	WATER SUPPLY PRESSURE			10 - 113 PSIG

Note: We reserve the right to make changes in specifications and design without prior notice.

3. KM-1601MRH3 with URC-21F

AC SUPPLY VOLTAGE	208-230/60/3			
AMPERAGE	8.4 A (5 Min. Freeze AT 104°F / WT 80°F)			
MINIMUM CIRCUIT AMPACITY	20 A			
MAXIMUM FUSE SIZE	20 A			
APPROXIMATE ICE PRODUCTION	Ambient	WATER TEMP. (°F)		
PER 24 HR.	Temp.(°F)	50	70	90
lbs./day (kg/day)	70	*1471 (667)	1448 (657)	1354 (614)
Reference without *marks	80	1453 (659)	1417 (643)	1290 (585)
	90	1448 (657)	*1392 (631)	1277 (579)
	100	1408 (639)	1365 (619)	1171 (531)
SHAPE OF ICE	Crescent Cube			
ICE PRODUCTION PER CYCLE	28.0 lbs. (12.7 kg) 1440 pcs.			
APPROXIMATE STORAGE CAPACITY	N/A			
ELECTRIC & WATER CONSUMPTION	90/70°F		70/50°F	
ELECTRIC W (kWH/100 lbs.)	2640(4.6)		2410(3.9)	
WATER gal./24HR (gal./100 lbs.)	267(19.2)		491(33.4)	
EXTERIOR DIMENSIONS (WxDxH)	30" x 27.4" x 41.7" (762 x 695 x 1059 mm)			
EXTERIOR FINISH	Stainless Steel, Galvanized Steel (Rear)			
WEIGHT	Net 259 lbs. (117 kg), Shipping 316 lbs. (143 kg)			
CONNECTIONS - ELECTRIC	Permanent - Connection			
- WATER SUPPLY	Inlet	1/2" FPT		
- DRAIN	Outlet	3/4" FPT		
		3/8" OD Tube		
CUBE CONTROL SYSTEM	Float Switch			
HARVESTING CONTROL SYSTEM	Hot Gas and Water, Thermistor and Timer			
ICE MAKING WATER CONTROL	Timer Controlled. Overflow Pipe			
COOLING WATER CONTROL	N/A			
BIN CONTROL SYSTEM	Thermostat			
COMPRESSOR	Hermetic, Model CS18K6E-TF5			
CONDENSER	Air-Cooled Remote, Condenser Unit URC-21F			
EVAPORATOR	Vertical type, Stainless Steel and Copper			
REFRIGERANT CONTROL	Thermostatic Expansion Valve			
	Condensing Pressure Regulator on URC-21F			
REFRIGERANT CHARGE	R-404A, 24 lb. 4.0 oz. (11,000g)			
	(Icemaker 14 lbs. 8.8 oz. Cond. Unit 9 lb. 11.2 oz.)			
DESIGN PRESSURE	High 467PSIG, Low 230PSIG			
P.C. BOARD CIRCUIT PROTECTION	High Voltage Cut-out (Internal)			
COMPRESSOR PROTECTION	Auto-reset Overload Protector (Internal)			
REFRIGERANT CIRCUIT PROTECTION	Auto-reset High Pressure Control Switch			
LOW WATER PROTECTION	Float Switch			
ACCESSORIES -SUPPLIED	N/A			
-REQUIRED	Ice Dispenser or Ice Storage Bin, Remote Condenser Unit			
OPERATING CONDITIONS	VOLTAGE RANGE			187 - 253 V
	AMBIENT TEMP.			45 -100° F
	WATER SUPPLY TEMP.			45 - 90° F
	WATER SUPPLY PRESSURE			10 - 113 PSIG

Note: We reserve the right to make changes in specifications and design without prior notice.

4. KM-1601MRH3 with URC-22F

AC SUPPLY VOLTAGE	208-230/60/3			
AMPERAGE	8.4 A (5 Min. Freeze AT 104°F / WT 80°F)			
MINIMUM CIRCUIT AMPACITY	20 A			
MAXIMUM FUSE SIZE	20 A			
APPROXIMATE ICE PRODUCTION	Ambient	WATER TEMP. (°F)		
PER 24 HR.	Temp.(°F)	50	70	90
lbs./day (kg/day)	70	*1486 (674)	1458 (661)	1366 (620)
Reference without *marks	80	1465 (664)	1422 (645)	1300 (590)
	90	1458 (661)	*1391 (631)	1280 (581)
	100	1422 (645)	1365 (619)	1178 (534)
SHAPE OF ICE	Crescent Cube			
ICE PRODUCTION PER CYCLE	28.3 lbs. (12.8 kg) 1440 pcs.			
APPROXIMATE STORAGE CAPACITY	N/A			
ELECTRIC & WATER CONSUMPTION	90/70°F		70/50°F	
ELECTRIC W (kWH/100 lbs.)	2640(4.55)		2460(3.97)	
WATER gal./24HR (gal./100 lbs.)	267(19.2)		498(33.5)	
CEC/CEE TIER LEVEL	2			
ENERGY STAR	YES			
EXTERIOR DIMENSIONS (WxDxH)	30" x 27.4" x 41.7" (762 x 695 x 1059 mm)			
EXTERIOR FINISH	Stainless Steel, Galvanized Steel (Rear)			
WEIGHT	Net 259 lbs. (117 kg), Shipping 316 lbs. (143 kg)			
CONNECTIONS - ELECTRIC	Permanent - Connection			
- WATER SUPPLY	Inlet	1/2" FPT		
- DRAIN	Outlet	3/4" FPT		
		3/8" OD Tube		
CUBE CONTROL SYSTEM	Float Switch			
HARVESTING CONTROL SYSTEM	Hot Gas and Water, Thermistor and Timer			
ICE MAKING WATER CONTROL	Timer Controlled. Overflow Pipe			
COOLING WATER CONTROL	N/A			
BIN CONTROL SYSTEM	Thermostat			
COMPRESSOR	Hermetic, Model CS18K6E-TF5			
CONDENSER	Air-Cooled Remote, Condenser Unit URC-22F			
EVAPORATOR	Vertical type, Stainless Steel and Copper			
REFRIGERANT CONTROL	Thermostatic Expansion Valve			
	Condensing Pressure Regulator on URC-22F			
REFRIGERANT CHARGE	R-404A, 22 lb. 4.3 oz. (10,100g)			
	(Icemaker 14 lbs. 8.8 oz. Cond. Unit 7 lb. 11.5 oz.)			
DESIGN PRESSURE	High 467PSIG, Low 230PSIG			
P.C. BOARD CIRCUIT PROTECTION	High Voltage Cut-out (Internal)			
COMPRESSOR PROTECTION	Auto-reset Overload Protector (Internal)			
REFRIGERANT CIRCUIT PROTECTION	Auto-reset High Pressure Control Switch			
LOW WATER PROTECTION	Float Switch			
ACCESSORIES -SUPPLIED	N/A			
-REQUIRED	Ice Dispenser or Ice Storage Bin, Remote Condenser Unit			
OPERATING CONDITIONS	VOLTAGE RANGE			187 - 253 V
	AMBIENT TEMP.			45 -100° F
	WATER SUPPLY TEMP.			45 - 90° F
	WATER SUPPLY PRESSURE			10 - 113 PSIG

Note: We reserve the right to make changes in specifications and design without prior notice.

B. Condenser Unit

1. URC-21F, URC-22F

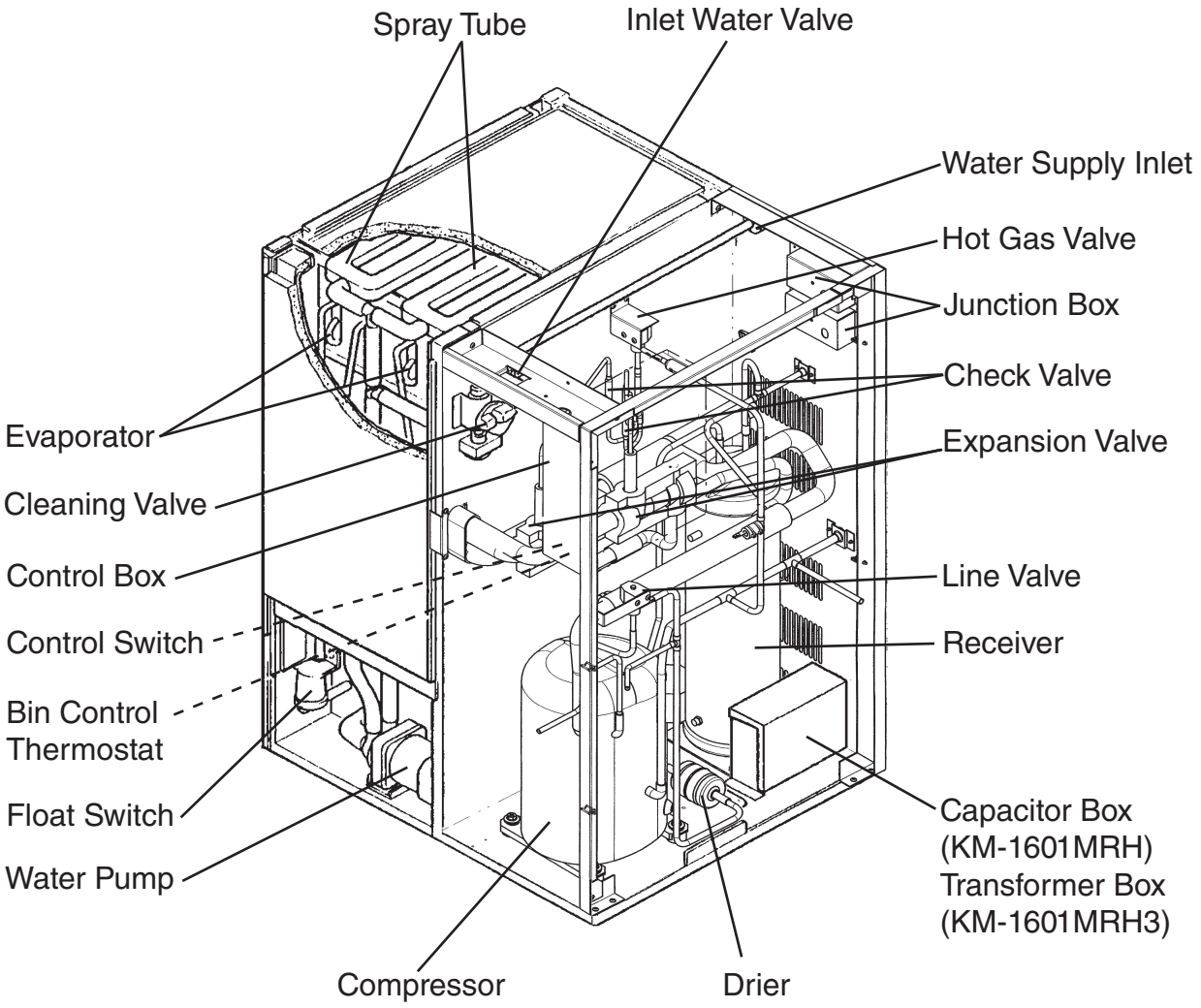
AC SUPPLY VOLTAGE		115/60/1 (Connection to Icemaker)		
FAN MOTOR		115 V	Total 2.6FLA	130W
EXTERIOR DIMENSIONS	(WxDxH)	46-3/8" x 15-11/16" x 25-15/16" (1178 x 398 x 659 mm)		
DIMENSIONS INCLUDING LEGS	(WxDxH)	48-7/16" x 18-1/8" x 40-7/8" (1230 x 460 x 1039 mm)		
EXTERIOR FINISH		Galvanized Steel		
WEIGHT	URC-21F	Net 158 lbs. (72 kg)	Shipping 169 lbs. (77 kg)	
	URC-22F	Net 134 lbs. (61 kg)	Shipping 145 lbs. (66 kg)	
CONNECTIONS - ELECTRIC		Permanent - Connection		
- REFRIGERANT		Discharge Line 1-1/16"-12 UNF Fitting (#10 PARKER)		
		Liquid Line	5/8"-18 UNF Fitting (#6 PARKER)	
CONDENSER		Air-cooled, Fin and tube type		
FAN MOTOR PROTECTION		Thermal Protection		
REFRIGERANT CONTROL		Condensing Pressure Regulator		
REFRIGERANT CHARGE	URC-21F	R-404A	9 lb. 11 oz.	(4400g)
	URC-22F	R-404A	7 lb. 11.5 oz.	(3500g)
DESIGN PRESSURE		High 467 PSIG	32.2 Bar	
OPERATING CONDITIONS		VOLTAGE RANGE	104 ~ 127 VAC	
		AMBIENT TEMP.	-20 ~ 122 °F	
ACCESSORIES -SUPPLIED		Leg		2 pcs
		Hex. Head Bolt w/Washer	8 x 16	8 pcs
		Hex. Nut	8	8 pcs

Note: We reserve the right to make changes in specifications and design without prior notice.

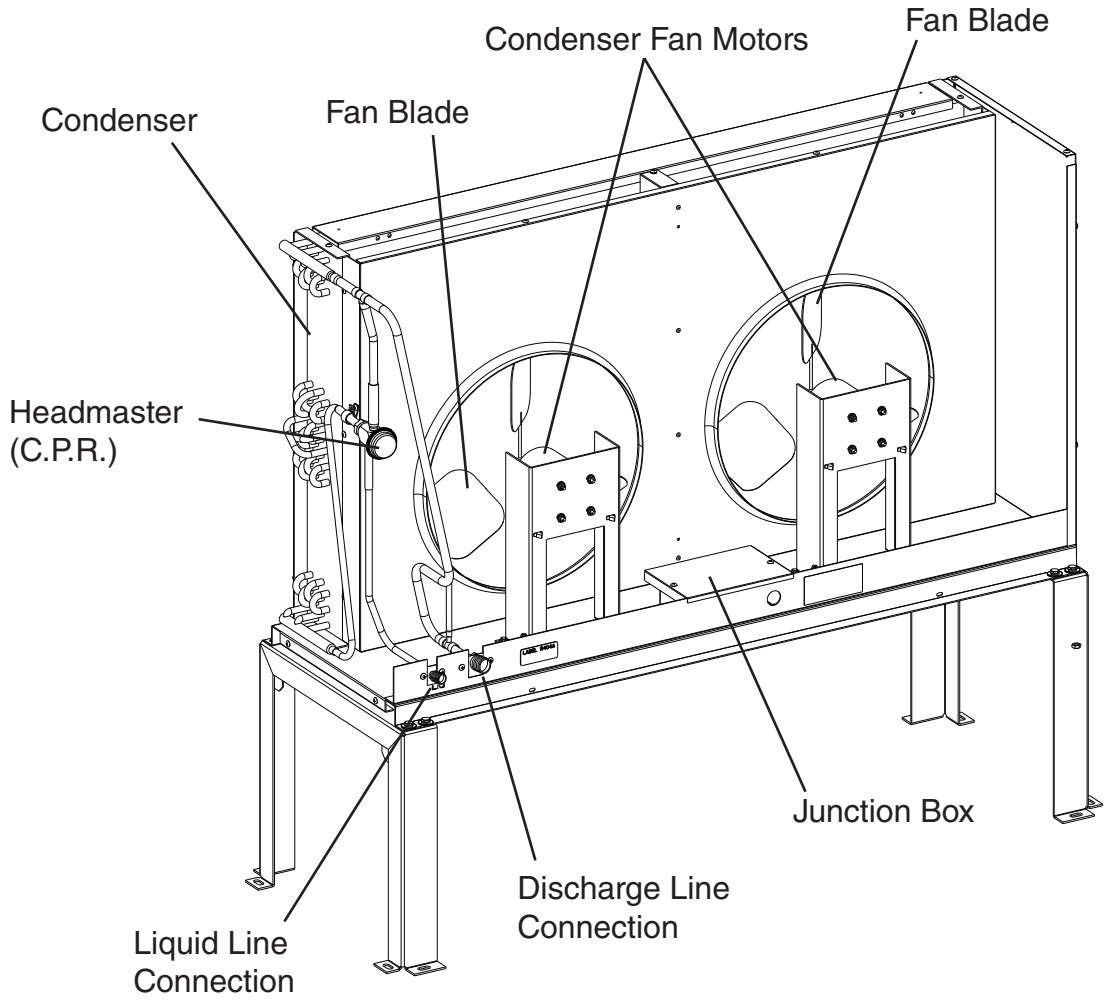
II. General Information

A. Construction

1. KM-1601MRH, KM-1601MRH3



2. URC-21F, URC-22F



B. Sequence of Operation

1. Sequence Cycles and Shutdown

The steps in the sequence are as outlined below. When power is supplied, a 5-second delay occurs at startup. Note that the order of the LEDs from the outer edge of the control board is 1, 4, 3, 2.

a) One Minute Fill Cycle

LED 4 is on. WV opens and the fill period begins. After 1 minute, the control board checks for a closed F/S. If F/S is closed, the harvest cycle begins. If not, WV will remain energized through additional 1 minute cycles until water enters the sump and F/S closes. This serves as a low water safety to protect the water pump.

b) Initial Harvest Cycle

LEDs 1, 4, and 2 are on. WV remains open, Comp and FMR energize, HGV opens, and harvest begins. As the evaporator warms, the thermistor located on the suction line checks for a 48°F (9°C) temperature. When 48°F (9°C) is reached, a 3.9 kΩ signal turns the harvest over to the adjustable harvest timer which is factory set for normal conditions. The timer has settings of 60, 90, 120, and 180 seconds (dip switch 1 & 2). The water valve is open during harvest for a maximum of 6 minutes or the length of harvest, whichever is shorter. When the harvest timer completes its count down, the harvest cycle is complete and the freeze cycle starts. The minimum total time allowed by the control board for a complete harvest cycle is 2 minutes.

c) Freeze Cycle

LED 1 is on. Comp and FMR continue to run, PM and FMS energize, LLV opens, HGV and WV close and the freeze cycle starts. For the first 5 minutes the control board will not accept a signal from F/S. This 5 minute minimum freeze acts as a short cycle protection. At the end of 5 minutes, F/S assumes control. As ice builds on the evaporator the water level in the sump lowers. The freeze continues until F/S opens and terminates ice production.

d) Pump-Out Cycle

LEDs 1, 3, and 2 are on. Comp and FMR continue to run, HGV opens, LLV closes, and FMS deenergizes. PM stops for 2 seconds and reverses, taking water from the bottom of the sump and forcing pressure against the check valve seat allowing water to go through the check valve and down the drain. At the same time water flows through the small tube to power flush the F/S. When the pump-out timer stops counting, the pump out is complete.

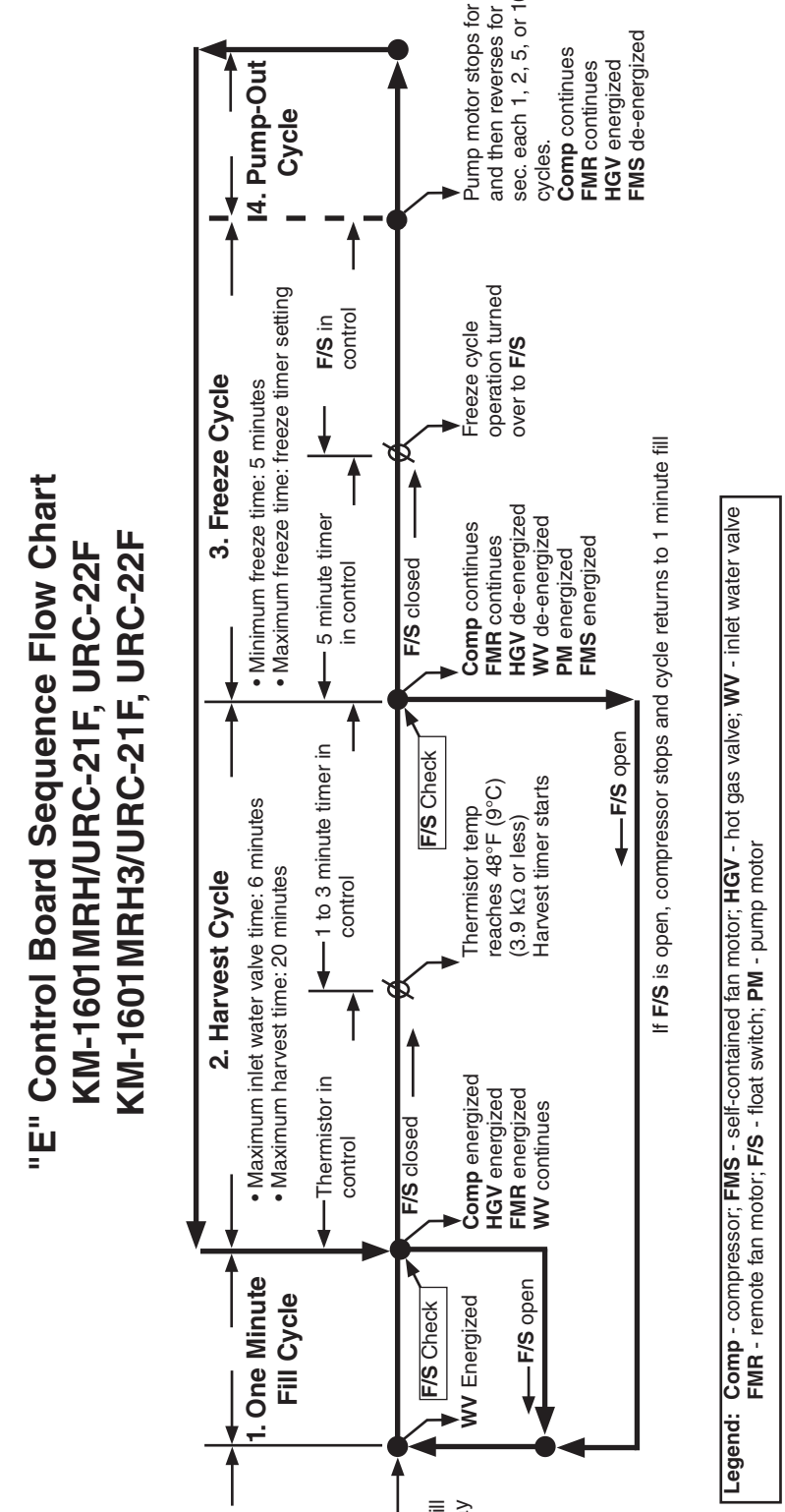
Pump out always occurs on the 2nd harvest after startup. Then, depending on the control board setting, pump out occurs every cycle, or every 2nd, 5th or 10th cycle (dip switch 5 & 6).

e) Normal Harvest Cycle

LEDs 1, 4, and 2 are on. Comp and FMR continue to run, HGV remains open and WV opens. As the evaporator warms, the thermistor reaches 48°F (9°C). The control board then receives the thermistor's 3.9 kΩ signal and starts the harvest timer. The water valve is open during harvest for a maximum of 6 minutes or the length of harvest, whichever is shorter. When the harvest timer completes its count down, the harvest cycle is complete and the next freeze cycle starts. The unit continues to cycle through 3, 4 and 5 sequence until the bin control senses ice and shuts the unit down.

Legend: **Comp**–compressor; **FMR**–remote fan motor; **FMS**–self-contained fan motor; **F/S**–float switch; **HGV**–hot gas valve; **LLV**–Liquid Line Valve; **PM**–pump motor; **WV**–inlet water valve

2. Sequence Flow Chart


"E" Control Board Sequence Flow Chart
KM-1601MRH/URC-21F, URC-22F
KM-1601MRH3/URC-21F, URC-22F
Cycle Steps
1. One Minute Fill Cycle
2. Harvest Cycle
3. Freeze Cycle
4. Pump-Out Cycle
Initial startup always begins here
"E" control board will have 5 second delay
F/S Check
WV Energized
F/S closed
Comp energized
HGV energized
FMR energized
WV continues
F/S open
• Maximum inlet water valve time: 6 minutes
• Maximum harvest time: 20 minutes
Thermistor in control
1 to 3 minute timer in control
Thermistor temp reaches 48°F (9°C) (3.9 kΩ or less)
Harvest timer starts
F/S Check
F/S closed
Comp continues
FMR continues
HGV de-energized
WV de-energized
PM energized
FMS energized
F/S open
• Minimum freeze time: 5 minutes
• Maximum freeze time: freeze timer setting
5 minute timer in control
F/S in control
Freeze cycle operation turned over to F/S
Pump motor stops for 2 sec. and then reverses for 10/20 sec. each 1, 2, 5, or 10 cycles.
Comp continues
FMR continues
HGV energized
FMS de-energized
If F/S is open, compressor stops and cycle returns to 1 minute fill
Legend: Comp - compressor; FMS - self-contained fan motor; HGV - hot gas valve; WV - inlet water valve
FMR - remote fan motor; F/S - float switch; PM - pump motor

C. Control Board

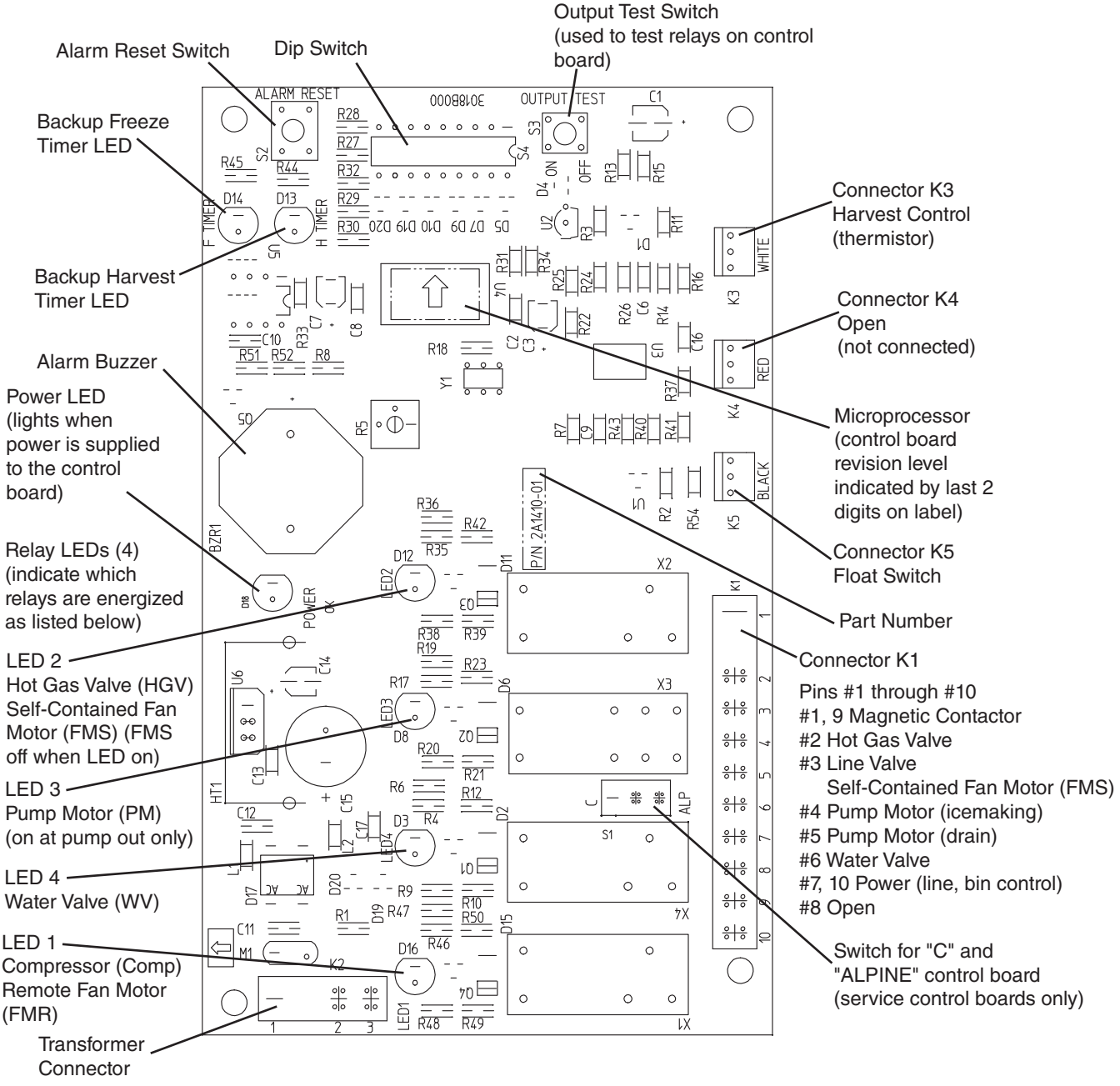
- A Hoshizaki exclusive solid-state control is employed in KM-1601MRH and KM-1601MRH3 Modular Crescent Cubers.
- All models are pretested and factory-adjusted.

CAUTION

1. The control board is fragile; handle very carefully.
2. The control board contains integrated circuits, which are susceptible to failure due to static discharge. It is especially important to touch the metal part of the unit when handling or replacing the control board.
3. Do not touch the electronic devices on the control board or the back of the control board.
4. Do not change wiring and connections. Do not misconnect K3, K4 and K5, because the same connector is used for the thermistor and float switch. K4 is not connected.
5. Always replace the whole control board assembly if it goes bad.
6. Do not short out power supply to test for voltage.

1. Control Board Layout

"E" Control Board



Control Board	
Part Number	2A1410-01 (factory); **2A1410-02 (service)**

2. LED Lights and Audible Alarm Safeties

The red LED indicates proper control voltage and will remain on unless a control voltage problem occurs. At startup a 5 second delay occurs while the control board conducts an internal timer check. A short beep occurs when the power switch is turned OFF.

The green LEDs 1 through 4 energize and sequence from initial startup as listed in the table below. Note that the order of the LEDs from the outer edge of the control board is 1, 4, 3, 2. For more information, see "II.B. Sequence of Operation."

Sequence Step	LED	Energized Components	Time LEDs are On		
			Min.	Max.	Avg.
1 Minute Fill Cycle	4	WV			60 seconds
Harvest Cycle	1, 4, and 2	WV, HGV, Comp, FMR	2 minutes	20 minutes	3 to 5 minutes
Freeze Cycle	1	Comp, PM, FMR/FMS, LLV	5 minutes	freeze timer setting	30 to 35 minutes
Reverse Pump Out	1, 3, and 2	Comp, HGV, PM, FMR	10 seconds	20 seconds	factory setting

The built in safeties shut down the unit and have alarms as follows:

No. of Beeps (every 3 sec.)	Type of Alarm	Notes
1	High Evaporator Temp. (temperature > 127°F (53°C)	Check for harvest problem (stuck HGV or relay), hot water entering unit, stuck HM, or shorted thermistor.
2	Harvest Backup Timer (harvest > 20 min. for two cycles in a row)	Orange LED marked H TIMER lights up. Check for open thermistor, HGV not opening, TXV leaking by, low charge, or inefficient compressor.
3	Freeze Timer (freeze > specified setting for two cycles in a row) Timer is factory set using dip switches 9 & 10	Yellow LED marked F TIMER lights up. Check for F/S stuck closed (up), WV leaking by, HGV leaking by, TXV not feeding properly, low charge, HM not bypassing, or inefficient compressor.
To manually reset the above safeties, press the alarm reset button with the power supply on.		
6	Low Voltage (92Vac ±5% or less)	Red LED will turn off if voltage protection operates. The control voltage safeties automatically reset when voltage is corrected.
7	High Voltage (147Vac ±5% or more)	

Legend: **Comp**–compressor; **FMR**–remote fan motor; **FMS**–self-contained fan motor; **F/S**–float switch; **HGV**–hot gas valve; **HM**–headmaster (C.P.R.); **LLV**–Liquid Line Valve; **PM**–pump motor; **TXV**–thermostatic expansion valve; **WV**–inlet water valve

3. Controls and Adjustments

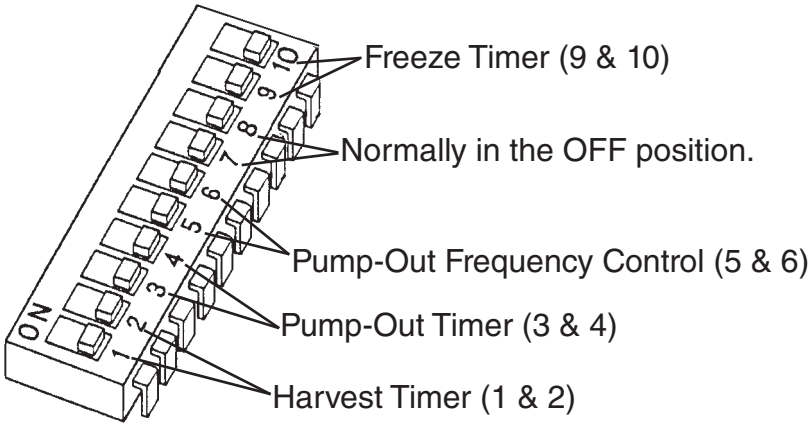
CAUTION

Dip switches are factory set. Failure to maintain factory settings may adversely affect performance and warranty coverage. For more information, contact Hoshizaki Technical Support at 1-800-233-1940.

a) Default Dip Switch Settings

The dip switch is factory-adjusted to the following positions:

Dip Switch No.	1	2	3	4	5	6	7	8	9	10
KM-1601MRH/3	OFF	OFF	ON	OFF	ON	ON	OFF	OFF	OFF	ON



b) Harvest Timer (dip switch 1 & 2)

The harvest timer starts counting when the thermistor reads 48°F (9°C) at the evaporator outlet and sends a 3.9 kΩ signal to the control board.

No adjustment is required under normal use, as the harvest timer is adjusted to the suitable position. However, a setting longer than the factory setting may be advised in cases where the flush provided at harvest needs to be prolonged for extra cleaning. Before changing this setting, call the Hoshizaki Technical Support Department at 1-800-233-1940 for recommendations. Keep in mind that setting the harvest timer to a longer setting will decrease 24 hour production.

Dip Switch Setting		Time (seconds)
No. 1	No. 2	
OFF	OFF	60
ON	OFF	90
OFF	ON	120
ON	ON	180

c) Pump-Out Timer (dip switch 3 & 4)

When a freeze cycle is completed, the pump motor stops, and the icemaker resumes operation in 2 seconds. Then, during cycles when a pump out is called for, the pump motor drains the water tank for the time determined by the pump-out timer. The pump-out timer also acts in place of the harvest timer during cycles with a pump out.
The pump-out timer is factory-adjusted, and no adjustment is required.

Dip Switch Setting		Time (seconds)	
No. 3	No. 4	T1	T2
OFF	OFF	10	150
ON	OFF	10	180
OFF	ON	10	120
ON	ON	20	180

T1: Time to drain the water tank
T2: Harvest timer at pump out

Pump out always occurs on the 2nd harvest after startup. Then, depending on the pump-out frequency control setting (dip switch 5 & 6), pump out occurs every cycle, or every 2nd, 5th or 10th cycle.

d) Pump-Out Frequency Control (dip switch 5 & 6)

The pump motor drains the water tank at the frequency set by the pump-out frequency control.
The pump-out frequency control is factory-adjusted to drain the water tank every 10 cycles, and no adjustment is required. However, where water quality is bad and the icemaker needs a pump drain more often, the pump-out frequency can be adjusted as shown in the table below:

Dip Switch Setting		Frequency
No. 5	No. 6	
OFF	OFF	every cycle
ON	OFF	every 2 cycles
OFF	ON	every 5 cycles
ON	ON	every 10 cycles

e) Factory Use (S4 dip switch 7 & 8)

Factory set for proper operation. Do not adjust. This must be left in the factory default position.

f) Freeze Timer (dip switch 9 & 10)

CAUTION

Adjust to proper specification, or the unit may not operate correctly.

The freeze timer setting determines the maximum allowed freeze time to prevent possible freeze-up issues. Upon termination of freeze timer, machine initiates the harvest cycle. After 2 consecutive timer terminations, machine will shut down, possibly indicating a problem.

The freeze timer is factory adjusted and no adjustment is required.

Dip Switch Setting		Time (minutes)
No. 9	No. 10	
OFF	OFF	60
OFF	ON	50
ON	OFF	70
ON	ON	60

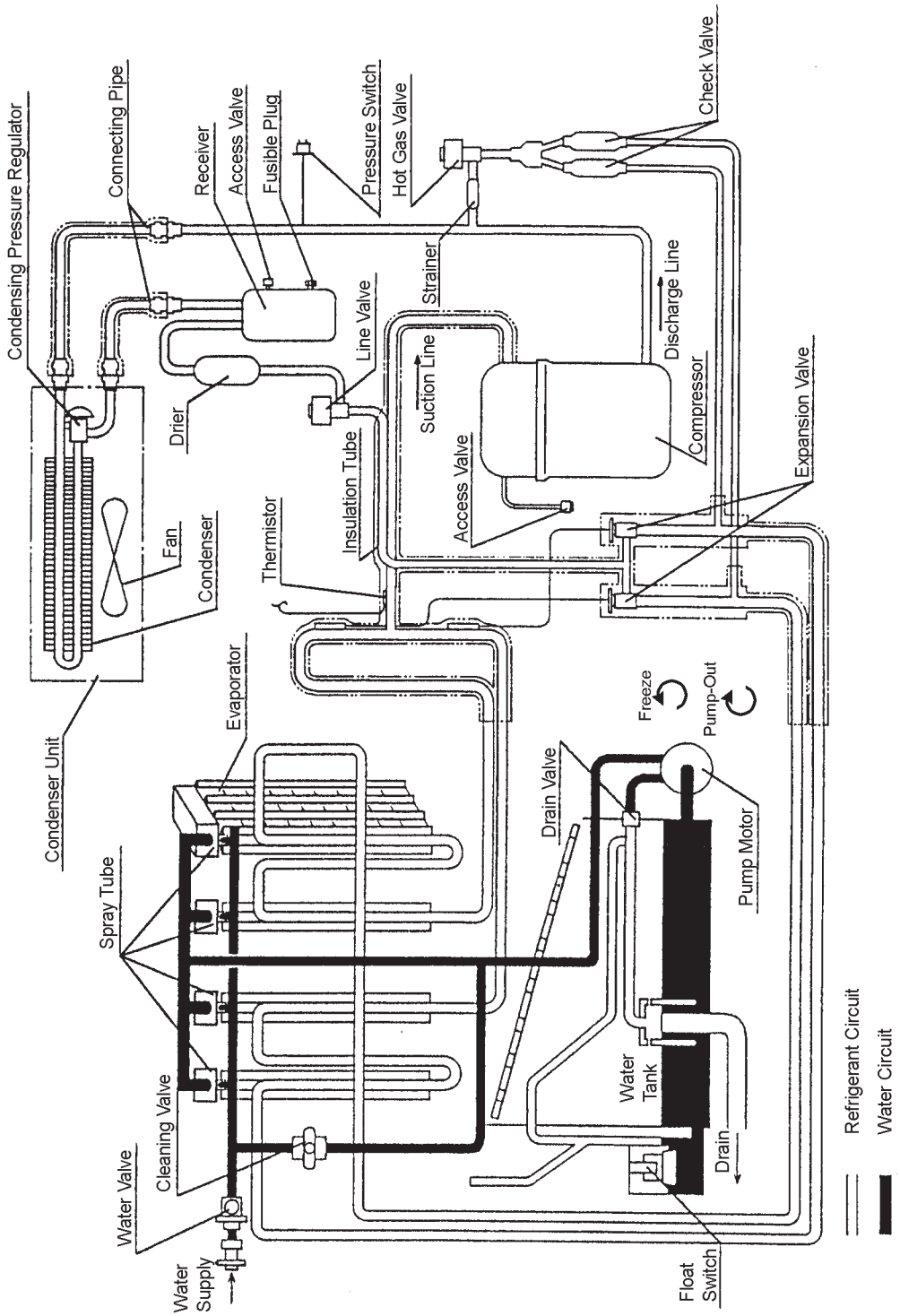
D. Control Switch

The control switch has three positions: "OFF" for power off, "ICE" for icemaking, and "WASH" to activate the water pump when cleaning and sanitizing.

III. Technical Information

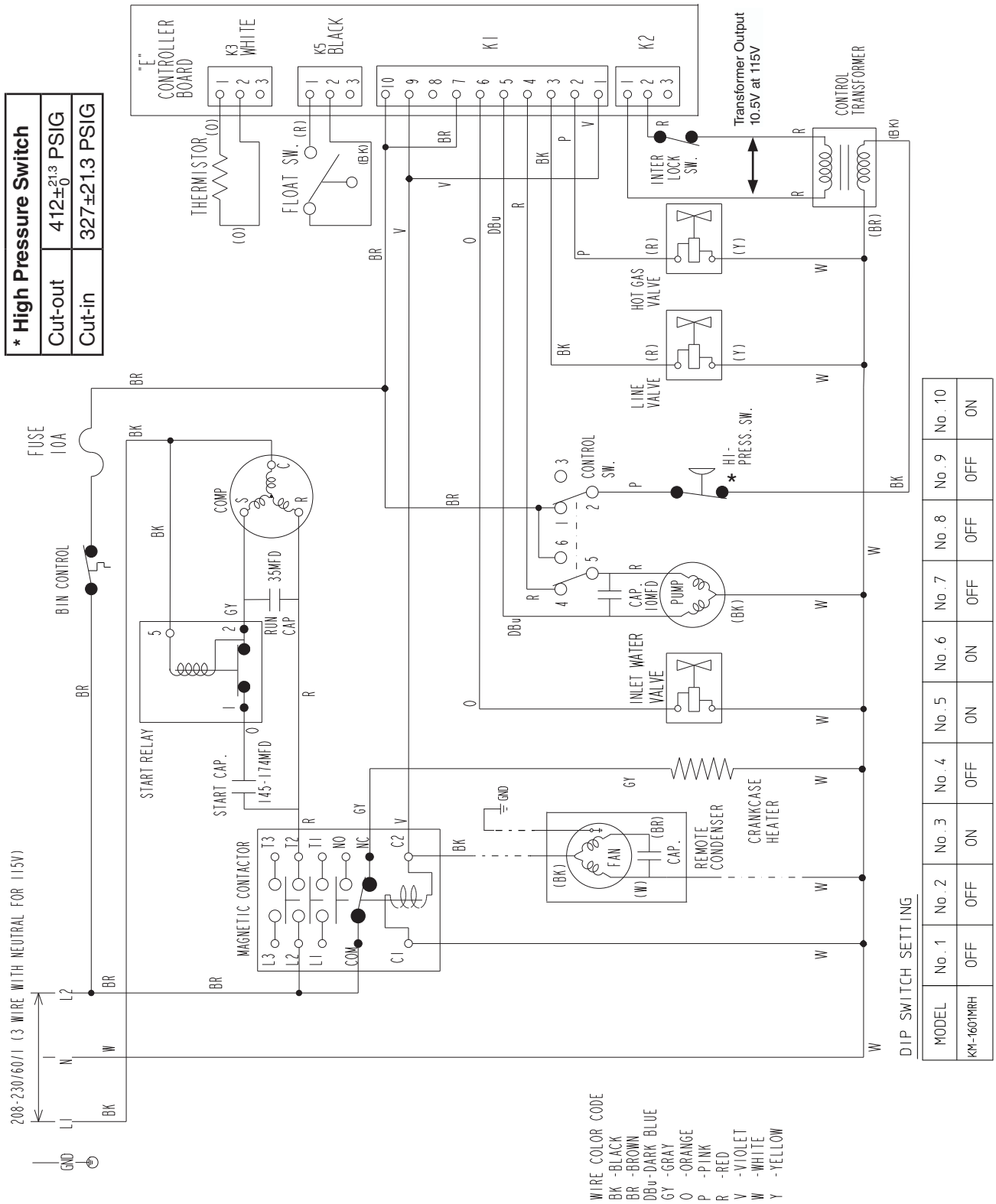
A. Water Circuit and Refrigeration Circuit

1. KM-1601MRH, KM-1601MRH3



B. Wiring Diagrams

1. KM-1601MRH

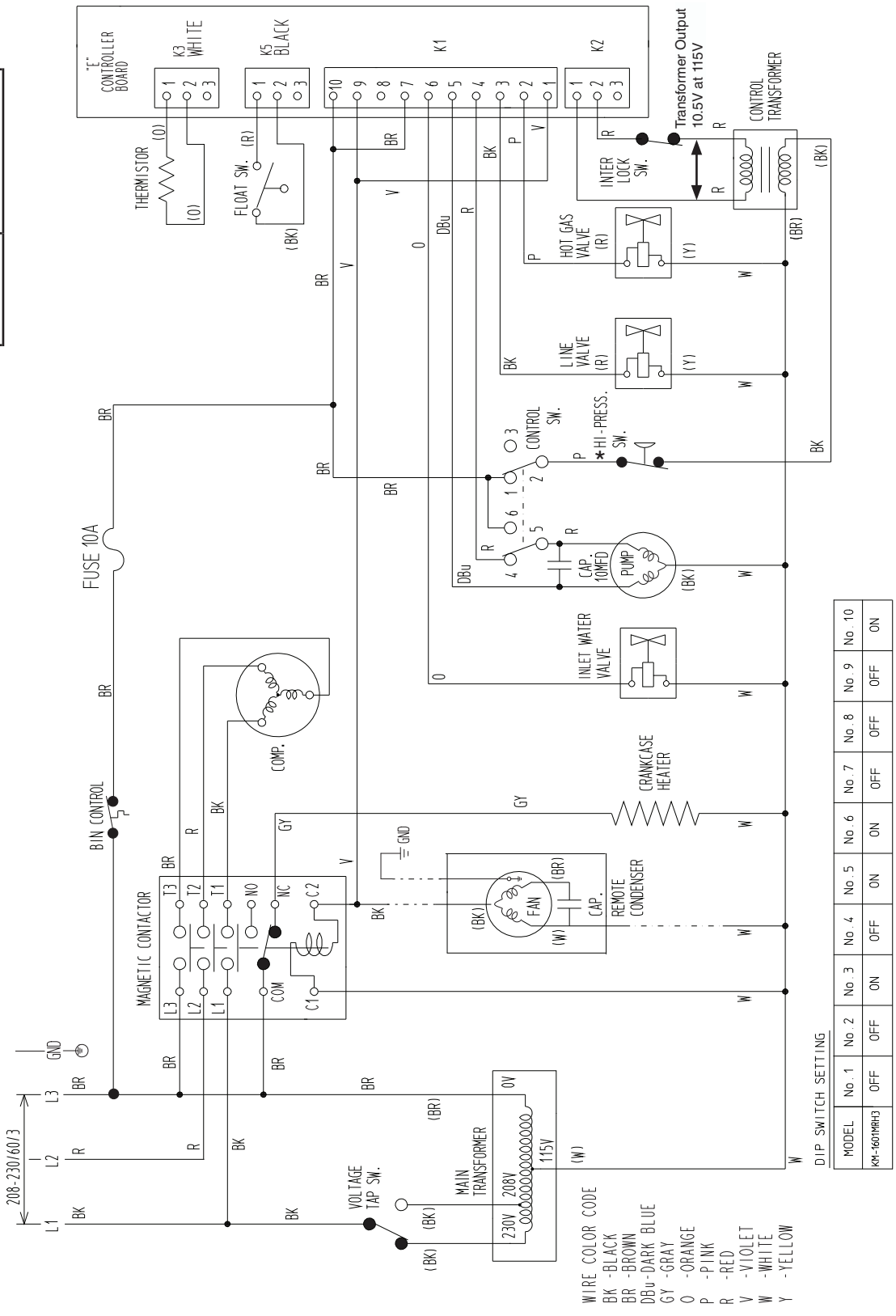


DIP SWITCH SETTING

MODEL	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10
KM-1601MRH	OFF	OFF	ON	OFF	ON	ON	OFF	OFF	OFF	ON

2. KM-1601MRH3

* High Pressure Switch	
Cut-out	$412\pm^{21.3}_{0}$ PSIG
Cut-in	327±21.3 PSIG



DIP SWITCH SETTING

MODEL	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10
KM-1601MRH3	OFF	OFF	ON	OFF	ON	ON	OFF	OFF	OFF	ON

C. Performance Data

1. KM-1601MRH with URC-21F

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (ºF/ºC)	WATER TEMP. (ºF/ºC) 50/10		70/21		90/32	
	70/21	**1508**	684	1483	673	1399	634
	80/27	1489	675	1450	658	1338	607
	90/32	1483	673	**1422**	645	1320	599
lbs./day kg./day	100/38	1449	657	1398	634	1227	557
APPROXIMATE ELECTRIC CONSUMPTION	70/21	**2450**		2514		2532	
	80/27	2499		2599		2577	
	90/32	2514		**2670**		2665	
watts	100/38	2494		2669		2660	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	**483**	1.83	418	1.58	363	1.37
	80/27	434	1.64	334	1.26	296	1.12
	90/32	418	1.58	**263**	1.00	217	0.82
gal./day m^3/day	100/38	335	1.27	252	0.95	174	0.66
FREEZING CYCLE TIME	70/21	**23**		24		26	
	80/27	24		25		27	
	90/32	24		**27**		28	
min.	100/38	24		27		30	
HARVEST CYCLE TIME	70/21	**5.3**		4.6		4.1	
	80/27	4.8		3.6		3.4	
	90/32	4.6		**2.8**		2.5	
min.	100/38	3.7		2.8		2.2	
HEAD PRESSURE	70/21	**200**	14.1	215	15.1	231	16.3
	80/27	211	14.9	234	16.5	249	17.5
	90/32	215	15.1	**251**	17.6	266	18.7
PSIG kg/cm^2G	100/38	217	15.3	254	17.9	281	19.8
SUCTION PRESSURE	70/21	**35**	2.5	37	2.6	39	2.7
	80/27	36	2.6	39	2.7	41	2.9
	90/32	37	2.6	**41**	2.9	43	3.0
PSIG kg/cm^2G	100/38	37	2.6	41	2.9	45	3.2

TOTAL HEAT OF REJECTION FROM CONDENSER	23,400 BTU/h [AT 90ºF (32ºC) / WT 70ºF (21ºC)]
TOTAL HEAT OF REJECTION FROM COMPRESSOR	3,200 BTU/h [AT 90ºF (32ºC) / WT 70ºF (21ºC)]
CONDENSER VOLUME	441 CU. IN (URC-21F)

Note:

1. Pressure data is recorded at 5 minutes into freezing cycle. The data not in **bold** should be used for reference only.
2. We reserve the right to make changes in specifications and design without prior notice.

2. KM-1601MRH with URC-22F

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (ºF/ºC)	WATER TEMP. (ºF/ºC)					
		50/10		70/21		90/32	
	70/21	**1493**	677	1471	667	1410	640
	80/27	1476	670	1441	654	1364	619
	90/32	1471	667	**1417**	643	1346	610
lbs./day kg./day	100/38	1449	657	1400	635	1280	581
APPROXIMATE ELECTRIC CONSUMPTION	70/21	**2590**		2634		2687	
	80/27	2623		2692		2741	
	90/32	2634		**2740**		2792	
watts	100/38	2642		2752		2840	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	**521**	1.97	446	1.69	396	1.50
	80/27	464	1.75	346	1.31	327	1.24
	90/32	446	1.69	**264**	1.00	230	0.87
gal./day m^3/day	100/38	355	1.34	256	0.97	200	0.76
FREEZING CYCLE TIME	70/21	**22**		24		25	
	80/27	23		25		27	
	90/32	24		**26**		28	
min.	100/38	24		27		30	
HARVEST CYCLE TIME	70/21	**5.4**		4.7		4.2	
	80/27	4.8		3.8		3.5	
	90/32	4.7		**3.0**		2.6	
min.	100/38	3.8		2.9		2.2	
HEAD PRESSURE	70/21	**205**	14.4	218	15.3	233	16.4
	80/27	215	15.1	236	16.6	249	17.5
	90/32	218	15.3	**250**	17.6	265	18.6
PSIG kg/cm^2G	100/38	220	15.5	254	17.8	279	19.6
SUCTION PRESSURE	70/21	**38**	2.7	40	2.8	42	3.0
	80/27	39	2.8	42	2.9	44	3.1
	90/32	40	2.8	**43**	3.1	46	3.2
PSIG kg/cm^2G	100/38	40	2.8	44	3.1	48	3.4

TOTAL HEAT OF REJECTION FROM CONDENSER	27,400 BTU/h [AT 90ºF (32ºC) / WT 70ºF (21ºC)]
TOTAL HEAT OF REJECTION FROM COMPRESSOR	3,200 BTU/h [AT 90ºF (32ºC) / WT 70ºF (21ºC)]
CONDENSER VOLUME	214 CU. IN.

Note:

1. Pressure data is recorded at 5 minutes into freezing cycle. The data not in **bold** should be used for reference only.
2. We reserve the right to make changes in specifications and design without prior notice.

3. KM-1601MRH3 with URC-21F

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (ºF/ºC)	WATER TEMP. (ºF/ºC)					
		50/10		70/21		90/32	
	70/21	**1471**	667	1448	657	1354	614
	80/27	1453	659	1417	643	1290	585
	90/32	1448	657	**1392**	631	1277	579
lbs./day kg./day	100/38	1408	639	1365	619	1171	531
APPROXIMATE ELECTRIC CONSUMPTION	70/21	**2410**		2477		2503	
	80/27	2461		2566		2555	
	90/32	2477		**2640**		2645	
watts	100/38	2460		2641		2650	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	**491**	1.86	426	1.61	368	1.39
	80/27	441	1.67	339	1.28	299	1.13
	90/32	426	1.61	**267**	1.01	218	0.83
gal./day m^3/day	100/38	340	1.29	256	0.97	173	0.66
FREEZING CYCLE TIME	70/21	**23**		24		26	
	80/27	23		25		27	
	90/32	24		**27**		29	
min.	100/38	24		27		31	
HARVEST CYCLE TIME	70/21	**5.7**		4.9		4.4	
	80/27	5.1		3.9		3.6	
	90/32	4.9		**3.1**		2.7	
min.	100/38	4.0		3.0		2.3	
HEAD PRESSURE	70/21	**203**	14.3	218	15.3	242	17.0
	80/27	214	15.1	237	16.7	263	18.5
	90/32	218	15.3	**253**	17.8	279	19.6
PSIG kg/cm^2G	100/38	224	15.7	259	18.2	303	21.3
SUCTION PRESSURE	70/21	**38**	2.7	40	2.8	42	2.9
	80/27	40	2.8	43	3.0	44	3.1
	90/32	40	2.8	**45**	3.2	47	3.3
PSIG kg/cm^2G	100/38	40	2.8	45	3.2	48	3.4

TOTAL HEAT OF REJECTION FROM CONDENSER	24,900 BTU/h [AT 90ºF (32ºC) / WT 70ºF (21ºC)]
TOTAL HEAT OF REJECTION FROM COMPRESSOR	3,200 BTU/h [AT 90ºF (32ºC) / WT 70ºF (21ºC)]
CONDENSER VOLUME	441 CU. IN (URC-21F)

Note:

1. Pressure data is recorded at 5 minutes into freezing cycle. The data not in **bold** should be used for reference only.
2. We reserve the right to make changes in specifications and design without prior notice.

4. KM-1601MRH3 with URC-22F

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (ºF/ºC)	WATER TEMP. (ºF/ºC)					
		50/10		70/21		90/32	
	70/21	**1486**	674	1458	661	1366	620
	80/27	1465	664	1422	645	1300	590
	90/32	1458	661	**1391**	631	1280	581
lbs./day kg./day	100/38	1422	645	1365	619	1178	534
APPROXIMATE ELECTRIC CONSUMPTION	70/21	**2460**		2513		2553	
	80/27	2500		2582		2605	
	90/32	2513		**2640**		2671	
watts	100/38	2510		2647		2700	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	**498**	1.88	430	1.63	375	1.42
	80/27	446	1.69	341	1.29	307	1.16
	90/32	430	1.63	**267**	1.01	223	0.84
gal./day m^3/day	100/38	344	1.30	257	0.97	183	0.69
FREEZING CYCLE TIME	70/21	**23**		25		26	
	80/27	24		26		28	
	90/32	25		**27**		29	
min.	100/38	25		28		31	
HARVEST CYCLE TIME	70/21	**4.7**		4.2		3.7	
	80/27	4.3		3.5		3.2	
	90/32	4.2		**2.9**		2.5	
min.	100/38	3.5		2.8		2.2	
HEAD PRESSURE	70/21	**210**	14.8	233	16.4	249	17.5
	80/27	228	16.0	264	18.6	270	19.0
	90/32	233	16.4	**290**	20.4	300	21.1
PSIG kg/cm^2G	100/38	231	16.2	292	20.6	310	21.8
SUCTION PRESSURE	70/21	**37**	2.6	39	2.7	41	2.9
	80/27	39	2.7	41	2.9	44	3.1
	90/32	39	2.7	**43**	3.1	46	3.2
PSIG kg/cm^2G	100/38	39	2.8	44	3.1	48	3.4

TOTAL HEAT OF REJECTION FROM CONDENSER	24,300 BTU/h [AT 90ºF (32ºC) / WT 70ºF (21ºC)]
TOTAL HEAT OF REJECTION FROM COMPRESSOR	3,200 BTU/h [AT 90ºF (32ºC) / WT 70ºF (21ºC)]
CONDENSER VOLUME	214 CU. IN.

Note:

1. Pressure data is recorded at 5 minutes into freezing cycle. The data not in **bold** should be used for reference only.
2. We reserve the right to make changes in specifications and design without prior notice.

IV. Service Diagnosis

⚠ WARNING

1. This unit should be diagnosed and repaired only by qualified service personnel to reduce the risk of death, electric shock, serious injury, or fire.
2. Risk of electric shock. Use extreme caution and exercise safe electrical practices.
3. Moving parts (e.g., fan blade) can crush and cut. Keep hands clear.
4. **CHOKING HAZARD:** Ensure all components, fasteners, and thumbscrews are securely in place after the unit is serviced. Make sure that none have fallen into the storage bin.
5. Make sure all food zones in the icemaker and storage bin are clean after the unit is serviced. For cleaning procedures, see "VI. Cleaning and Maintenance Instructions."

A. Diagnostic Procedure

The diagnostic procedure is basically a sequence check which can be used at unit start-up or for system diagnosis. Using this check out procedure will allow you to diagnose electrical system and component failures in approximately 10 minutes under normal operating conditions of 70°F or warmer air and 50°F or warmer water temperatures. Before conducting a 10 minute checkout, check for correct installation, proper voltage per unit nameplate and adequate water supply. As you go through the procedure, check to assure the components energize and de-energize correctly. If not, those components and controls are suspect. Check for voltage at the 10-pin connector.

1) Turn off the power supply, then access the control box. Clear any ice from bin control bulb.

2) Turn on the power supply, then move the control switch to the "ICE" position. A 5 second delay occurs.

3) **One Minute Fill Cycle** – The inlet water valve is energized. After 1 minute, the control board checks the float switch. If the float switch is closed, the unit cycles to harvest. If closed, continue to step 4. If the float switch is open, the unit repeats the 1 minute fill cycle until water enters and the float switch closes (low water safety protection during initial start up and at the end of each harvest). **Diagnosis:** If the water valve does not open, check for no supply voltage at water valve terminals, bad coil, or plugged screen or external filter (no water flow). If unit fails to start harvest, check for open float switch or bad 1 minute timer in control board.

4) **Initial Harvest Cycle** – Inlet water valve remains energized, contactor coil energizes to start the compressor (and fan motor on a remote condenser unit), and the hot gas valve energizes. The evaporator warms and the thermistor senses 48°F (9°C). The control board then receives the thermistor's 3.9 kΩ signal and turns operation of harvest over to the harvest timer. The timer completes counting (1 to 3 minutes). The unit then cycles to freeze. **Diagnosis:** Check if compressor is running, hot gas valve is open, water valve still open. Average harvest cycle at factory setting is 2 to 3 minutes. How long does initial harvest last? 1.5 minutes after initial harvest begins, touch the compressor discharge line. Is it hot? If not check refrigerant pressures and compressor operation. If it is hot, touch the inlet line to the evaporator. Is it hot? If it is hot and the freeze cycle is not starting, check the harvest timer adjustment, the thermistor for open circuit, the discharge line temperature, compressor efficiency, and if the hot gas valve is fully open.

5) **Freeze Cycle** – compressor remains energized, pump motor, (line valve on remote condenser unit), and fan motor energize. The inlet water valve and hot gas valve de-energize. The unit is held in freeze by a 5 minute short cycle protection timer. After 5 minutes, the freeze cycle operation is transferred to the float switch for freeze termination. During the first 5 minutes of freeze, confirm that the evaporator temperature drops. After 7 minutes in freeze, remove the black float switch lead from the K5 connector. The unit should immediately switch to the pump-out cycle. **Diagnosis:** If the evaporator is not cold, check to see if the hot gas valve is still open or if the expansion valve is not opening properly, if the water valve is continuing to fill the reservoir, if there are improper unit pressures, an inoperative compressor, or an inoperative headmaster (C.P.R.) (remote condenser unit only). If the unit remains in freeze with the float switch removed, replace the control board.

   Note: Normal freeze cycle will last 20 to 40 minutes depending on model and conditions. Cycle times and pressures should follow performance data provided in this manual.

6) **Pump-Out Cycle (10/20 second pump out)** – the compressor remains energized, the hot gas valve energizes, the fan motor de-energizes, the pump motor stops for 2 seconds and starts in reverse rotation for 10/20 seconds. (This removes contaminants from the water reservoir through the check valve (drain valve) and down the drain and allows for a power flush of the float switch.) Check for clear tubing at the check valve housing and check the unit drain for water flow. **Diagnosis:** If the pump motor does not reverse, check the circuit and capacitor. If water does not pump out, remove the check valve (drain valve) housing and check/clean the valve assembly.

7) **Normal Harvest Cycle** – same as the initial harvest cycle – Return to step 4.

   Note: Unit continues to cycle until bin control is satisfied or power is switched OFF. (The pump out cycle can be adjusted to occur every cycle, or every 2, 5, or 10 cycles. The factory default is every 10 cycles.) The unit always restarts at the 1 minute fill cycle.

8) **Shutdown –** When the unit is running hold ice in contact with the thermostatic bulb, the thermostatic bin control switch opens within 10 seconds, shutting down the unit. The bin control is factory set, and generally no adjustment is required. However, adjustment may be needed in some conditions, particularly at higher altitude locations. **Diagnosis:** See "IV.C. Bin Control Check."

B. Control Board Check

Before replacing a control board that does not show a visible defect and that you suspect is bad, always conduct the following check procedure. This procedure will help you verify your diagnosis.

Alarm Reset: If the control board is in alarm (beeping), press the "ALARM RESET" button on the control board while the control board is beeping. **WARNING! Risk of electric shock. Care should be taken not to touch live terminals.** Once reset, the unit starts at the 1-minute fill cycle. For audible alarm information, see "II.C.2. LED Lights and Audible Alarm Safeties."

1) Check the dip switch settings to assure that S4 dip switch #3, 4, 7, 8, 9, & 10 and S5 dip switch 1 through 5 are in the factory default position. S4 dip switch 1, 2, 5, & 6 are cleaning adjustments and the settings are flexible. For factory default settings, see "II.C.3. Default Dip Switch Settings."

2) Move the control switch to the "ICE" position. If the red "POWER OK" LED is on, the control voltage is good. If the red "POWER OK" LED is off, clear ice away from the thermostatic bin control bulb in the storage bin area. If no ice is near the thermostatic bin control bulb or the red "POWER OK" LED does not come on even after clearing away ice, check the thermostatic bin control. See "IV.C. Bin Control Check." If the thermostatic bin control is okay (closed) and the red "POWER OK" LED is off, check the fuse, control switch contacts, high-pressure switch, and control transformer secondary circuit. Transformer output is 10.5V at 115V primary input. If the secondary circuit has proper voltage and the red LED is off, the control board is bad and should be replaced.

   If the secondary circuit does not have proper voltage, check the control transformer primary circuit. Check for 115V at the control board K1 ten-pin connector. Check the #10 pin (BR wire) to a white neutral wire for 115V. (Always choose a white neutral wire to establish a good neutral connection when checking voltages.) For additional checks, see "IV.F.1. No Ice Production."

3) The "OUTPUT TEST" button provides a relay sequence test. Make sure the control switch is in the "ICE" position, then press the "OUTPUT TEST" button. The correct lighting sequence is 2, 3, 4, 1. Note that the order of the LEDs from the outer edge of the control board is 1, 4, 3, 2. Components (e.g., compressor) will cycle during the test. Following the test, the icemaker resumes operation. If the LEDs do not light as described above, the control board is bad and should be replaced.

4) To verify voltage output from the control board to the components, slide the control board K1 ten-pin connector out far enough to allow multimeter lead contact. With the unit in the cycle to be tested, check output voltage from the corresponding pin on the control board K1 ten-pin connector to ground. If output voltage is not found and the appropriate LED is on, the control board is bad and should be replaced.

C. Bin Control Check

To check the thermostatic bin control, follow the steps below.

CAUTION

When the ambient temperature is below 45°F (7°C), the thermostatic bin control switch opens and shuts down the icemaker even if the ice storage bin is empty. When the thermostat is set in the prohibited range, the icemaker operates continuously even if the ice storage bin is filled with ice. Setting in the prohibited range may result in severe damage to the icemaker.

The thermostatic bin control is factory set, and generally no adjustment is required. However, adjustment may be needed in some conditions, particularly at higher altitude locations. Note that when the thermostatic bin control switch is open, the control board red "POWER OK" LED is off.

1) Turn off the power supply.
2) Remove the front panel, then move the control switch to the "OFF" position.
3) Clear any ice away from the thermostatic bin control bulb.
4) Remove the control box cover, then disconnect the thermostatic bin control wires from the thermostatic bin control switch.
5) Hold your hand around the thermostatic bulb to warm it up.
6) Check for continuity across the thermostatic bin control switch. If closed, continue to step 6. If open, adjust or replace the thermostatic bin control.
7) With the multimeter test leads still in place, hold ice on the thermostatic bin control bulb to lower the temperature. Within 10 seconds, the thermostatic bin control switch should open (no continuity). If it remains closed, adjust or replace the thermostatic bin control.

D. Float Switch Check and Cleaning

The float switch is used to determine that there is sufficient water in the tank after the 1-minute fill cycle and after each harvest cycle. The float switch is also used to determine that the appropriate volume of water has been converted into ice before switching out of the freeze cycle. No adjustment is required.

1. Float Switch Check

To check the float switch, follow the steps below.

1) Turn off the power supply.
2) Remove the front panel, then move the control switch to the "OFF" position.
3) Remove the insulation panel, then remove the drain plug located on the lower front part of the ice chute. See Fig. 1. Allow the water tank to drain.
4) Replace the drain plug in its correct position. Be careful not to cross thread it.
5) Remove the control box cover.
6) Disconnect the black float switch connector from the control board BLACK K5 connector.

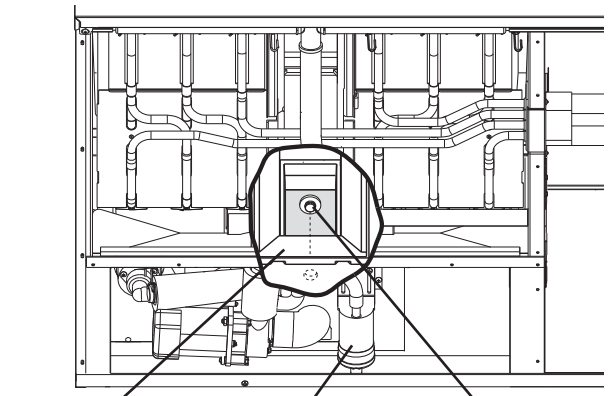


Fig. 1

7) Check for continuity across the float switch leads. With the water tank empty, the float switch should be open. If open, continue to step 8. If closed, follow the steps in "IV.D.2. Float Switch Cleaning." After cleaning the float switch, check it again. Replace if necessary.
8) Reconnect the black float switch connector to the control board BLACK K5 connector, then replace the control box cover in its correct position.
9) Move the control switch to the "ICE" position. Replace the insulation panel and the front panel in their correct positions, then turn on the power supply. After 1 minute, the 1-minute fill cycle should end and the initial harvest cycle should begin. If the initial harvest cycle begins, the float switch is good and the check is complete. If the initial harvest cycle does not begin, continue to step 10.
10) Turn off the power supply.
11) Remove the front panel, then move the control switch to the "OFF" position.
12) Remove the control box cover.
13) Disconnect the black float switch connector from the control board BLACK K5 connector.
14) Check for continuity across the float switch leads. With the water tank full, the float switch should be closed. If the float switch is closed and the icemaker will not switch from the 1-minute fill cycle to the initial harvest cycle, replace the control board.

    If open, confirm that the water tank is full. If the tank is not full, check the water supply, water filters, and inlet water valve. If the tank is full, follow the steps in "IV.D.2. Float Switch Cleaning." After cleaning the float switch, check it again. Replace if necessary.

2. Float Switch Cleaning

Depending on local water conditions, scale may build up on the float switch. Scale on the switch can cause the float to stick. In this case, the float switch should be cleaned.

1) Turn off the power supply.
2) Remove the front panel, then move the control switch to the "OFF" position.
3) Remove the insulation panel, then remove the drain plug located on the lower front part of the ice chute. See Fig. 1. Allow the water tank to drain.
4) Replace the drain plug in its correct position. Be careful not to cross thread it.
5) Disconnect the vent tube and the flush tube from the top of the float switch, then remove the float switch assembly from the mounting bracket and remove the rubber boot from the bottom of the float switch assembly. See Fig. 2.
6) Remove the retainer rod from the bottom of the float switch assembly, then remove the float. Be careful not to bend the retainer rod excessively when removing it.
7) Wipe down the float switch assembly's housing, shaft, float, and retainer rod with a mixture of 1 part Hoshizaki "Scale Away" and 25 parts warm water. Clean the inside of the rubber boot and hose with cleaning solution. Rinse the parts thoroughly with clean water.
8) Reassemble the float switch assembly and replace it and the rubber boot in their correct positions. Reconnect the vent tube and the flush tube.
9) Move the control switch to the "ICE" position.
10) Replace the insulation panel and front panel in their correct positions.
11) Turn on the power supply to start the automatic icemaking process.

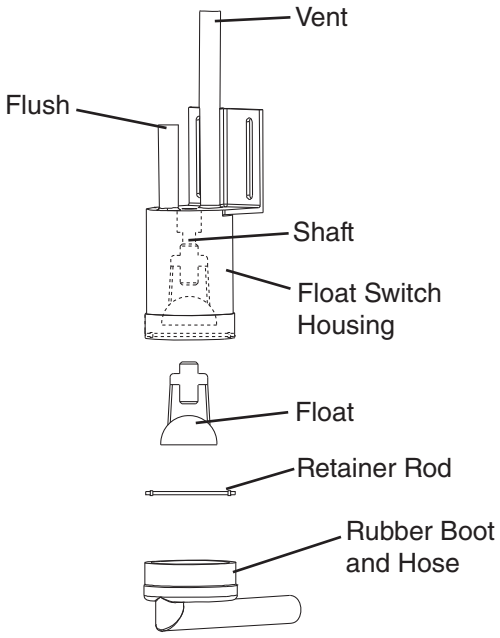


Fig. 2

E. Thermistor Check

To check thermistor resistance, follow the steps below.

1) Turn off the power supply.
2) Remove the front panel, then move the control switch to the "OFF" position.
3) Remove the control box cover.
4) Remove the thermistor.
5) Immerse the thermistor sensor portion in a glass containing ice and water for 2 or 3 minutes.
6) Disconnect the white thermistor connector from the control board WHITE K3 connector and check the resistance between thermistor leads. Normal reading is within 4.7 to 6.2 kΩ. If outside the normal reading, replace the thermistor. See "V.B. Important Notes for Component Replacement." If inside the normal reading, continue to the next step.
7) Replace the thermistor in its correct position. See "V.B. Important Notes for Component Replacement."
8) Reconnect the white thermistor connector to the control board WHITE K3 connector.
9) Replace the control box cover in its correct position, then turn on the power supply.
10) Move the control switch to the "ICE" position.
11) Once the harvest cycle starts, begin timing the harvest cycle.
12) The harvest timer should expire and terminate the harvest cycle within 2 to 3 minutes. If the harvest timer does not expire and terminate the harvest cycle, the harvest timer is bad and the control board should be replaced.

F. Diagnostic Charts

Before consulting the diagnostic charts, check for correct installation, proper voltage per unit nameplate, and adequate water supply. Check CB using the steps in "IV.B. Control Board Check." Check the dip switch settings to assure that S4 dip switch 3, 4, 7, 8, 9, 10, are in the factory default position. S4 dip switch 1, 2, 5, 6 are cleaning adjustments and the settings are flexible. For factory default settings, see "II.C.3.a) Default Dip Switch Settings."

1. No Ice Production

Problem	Possible Cause		Remedy
[1] The icemaker will not start.	a) Power Supply	1. OFF position.	1. Move to ON position.
		2. Loose connection.	2. Tighten.
		3. Bad contacts.	3. Check for continuity and replace.
		4. Voltage too high or too low.	4. Check and get recommended voltage.
	b) Fuse (Inside fused disconnect, if any)	1. Blown.	1. Check for short circuit and replace.
	c) Control Switch	1. OFF position.	1. Move to ICE position.
		2. Bad contacts.	2. Check for continuity and replace.
	d) Bin Control Thermostat	1. Tripped with bin filled with ice.	1. Remove ice.
		2. Ambient temperature too cool.	2. Increase ambient temperature.
		3. Set too warm.	3. See "IV.C. Bin Control Check."
		4. Bulb out of position.	4. Place in position.
		5. Bad contacts.	5. Check for continuity and replace.
	e) High Pressure Control	1. Bad contacts.	1. Check for continuity and replace.
		2. Dirty air filter or condenser.	2. Clean.
		3. Ambient or condenser water temperature too warm.	3. Reduce temperature.
		4. Refrigerant overcharged.	4. Recharge.
		5. Fan not operating.	5. See chart 1.[6]
		6. Refrigerant line or components plugged.	6. Clean and replace drier.

Problem	Possible Cause		Remedy
[1] The icemaker will not start. (continued).	f) Transformer	1. Coil winding opened or shorted.	1. Replace.
	g) Wiring to Control Board	1. Loose connections or open.	1. Check for continuity and replace.
	h) Thermistor	1. Leads shorted or opened and high temperature or harvest backup timer safety operates. (1 beep or 2 beep alarm)	1. See "II.C.3. Controls and Adjustments, b) Harvest Timer."
	i) Hot Gas Valve	1. Continues to open in freeze cycle and freeze timer safety operates. (3 beep alarm)	1. Check for hot gas valve stuck open and replace.
	j) Water Supply Line	1. Water supply off and water supply cycle does not finish.	1. Check and get recommended pressure.
		2. Condenser water pressure too low or off and pressure control opens and closes frequently to finally operate high temperature safety. (1 beep alarm)	2. Check and get recommended pressure.
	k) Inlet Water Valve	1. Mesh filter or orifice gets clogged and water supply cycle does not finish.	1. Clean.
		2. Coil winding opened.	2. Replace.
		3. Wiring to water valve.	3. Check for loose connection or open, and replace.
	l) Control Board	1. Defective.	1. See "IV.B. Control Board Check."
	m) Interlock Switch (Cleaning Valve)	1. OFF Position	1. Move to ON position.
		2. Bad contacts.	2. Check for continuity and replace.
	n) Wash Switch	1. WASH position.	1. Move to ICE position.
		2. Bad contacts.	2. Check and replace.
[2] Water continues to be supplied, and the icemaker will not start.	a) Float Switch	1. Connector disconnected.	1. Place in position.
		2. Leads opened or defective switch.	2. Check and replace.
		3. Float does not move freely.	3. Clean or replace.
	b) Control Board	1. Defective.	1. Replace.

Problem	Possible Cause		Remedy
[3] Compressor will not start or stops operating.	a) Magnetic Contactor	1. Bad contacts.	1. Check for continuity and replace.
		2. Coil winding opened.	2. Replace.
	b) Start Capacitor or Run Capacitor	1. Defective.	1. Replace.
	c) Internal Overload Protector Open (check 1 through 3 to the right and d through f below)	1. Loose terminal.	1. Tighten or replace.
		2. Voltage.	2. Check and correct.
		3. Dirty condenser.	3. Clean.
	d) Starter	1. Bad contacts.	1. Check and replace.
		2. Coil winding opened.	2. Replace.
	e) Compressor	1. Wiring to compressor.	1. Check for loose connection or open, and replace.
		2. Defective.	2. Replace.
		3. Protector tripped.	3. Reduce temperature.
	f) Control Board	1. No power to contactor.	1. See "IV.B. Control Board Check."
[4] Water continues to be supplied in freeze cycle.	a) Inlet Water Valve	1. Diaphragm does not close.	1. Check for water leaks with icemaker off.
	b) Control Board	1. Defective.	1. See "IV.B. Control Board Check."
[5] No water comes from spray tubes. Water pump will not start, or freeze cycle time is too short.	a) Water Supply Line	1. Water pressure too low and water level in water tank too low.	1. Check and get recommended pressure.
	b) Inlet Water Valve	1. Dirty mesh filter or orifice and water level in water tank too low.	1. Clean.
	c) Water System	1. Water leaks.	1. Check connections for water leaks, and replace.
		2. Clogged.	2. Clean.
		3. Pump out check valve leaking by.	3. Check assembly and clean.
	d) Pump Motor	1. Motor winding opened.	1. Replace.
		2. Bearing worn out.	2. Replace.
		3. Wiring to pump motor.	3. Check for loose connection or open, and replace.
		4. Defective capacitor.	4. Replace.
		5. Defective or bound impeller.	5. Replace and clean.
		6. Mechanical seal worn out.	6. Check and replace.
	e) Control Board	1. Defective.	1. See "IV.B. Control Board Check."

Problem	Possible Cause		Remedy
[6] Fan motor will not start, or is not operating.	a) Fan Motor	1. Motor winding opened.	1. Replace.
		2. Bearing worn out.	2. Replace.
		3. Wiring to fan motor.	3. Check for loose connection or open, and replace.
		4. Defective capacitor.	4. Replace.
		5. Fan blade bound.	5. Check and replace.
	b) Control Board	1. Defective.	1. See "IV.B. Control Board Check."
[7] All components run, but no ice is produced.	a) Refrigerant	1. Undercharged.	1. Check for leaks and recharge.
		2. Air or moisture trapped.	2. Replace drier and recharge.
	b) Compressor	1. Defective valve.	1. Replace.
	c) Hot Gas Valve	1. Continues to open in freeze cycle.	1. Check and replace.
	d) Line Valve	1. Continues to close in freeze cycle.	1. Check and replace.
	e) Inlet Water Valve	1. Water valve is wide open during freeze.	1. Check for water leaks with icemaker off.
	f) Headmaster (C.P.R.) (Remote Unit)	1. Not operating properly and liquid line temperature too warm.	1. Replace headmaster.

2. Evaporator is Frozen Up

Problem	Possible Cause		Remedy
[1] Freeze cycle time is too long.	a) Float Switch	1. Leads short-circuit or defective switch.	1. Check and replace.
		2. Float does not move freely.	2. Clean or replace.
	b) Inlet Water Valve	1. Diaphragm does not close.	1. Check for water leaks with icemaker off.
	c) Control Board	1. Defective.	1. See "IV.B. Control Board Check."
[2] All ice formed on evaporator does not fall into bin in harvest cycle.	a) Evaporator	1. Scaled up.	1. Clean.
	b) Water Supply Line	1. Water pressure too low.	1. Check and get recommended pressure.
	c) Water Filter System	1. Dirty/Restricted	1. Replace filter.
	d) Inlet Water Valve	1. Dirty mesh filter or orifice.	1. Clean.
		2. Diaphragm does not close.	2. Check for water leaks with icemaker off.
	e) Ambient and/or water temperature.	1. Too cool.	1. Increase temperature.
	f) Line Valve	1. Continues to open in harvest cycle.	1. Check operation in harvest cycle and replace.

Problem	Possible Cause		Remedy
[2] All ice formed on ecaorator does not fall into bin in harvest. (continued).	g) Thermistor	1. Out of position or loose attachment.	1. See "V.B. Important Notes for Component Replacement."
	h) Control Board	1. Harvest timer is set too short.	1. Adjust longer, referring to "II.C.3. Controls and Adjustments, c) Harvest Timer.
		2. Defective.	2. See "IV.B. Control Board Check."
[3] Other	a) Spray Tubes	1. Clogged.	1. Clean
		2. Out of position.	2. Place in position.
	b) Water System	1. Dirty.	1. Clean.
	c) Refrigerant	1. Undercharged.	1. Check for leaks and recharge.
	d) Expansion Valve	1. Bulb out of position or loose attachment.	1. Place in position.
		2. Defective.	2. Replace.
	e) Hot Gas Valve	1. Coil winding opened.	1. Replace.
		2. Plunger does not move.	2. Replace.
		3. Wiring to hot gas valve.	3. Check for loose connection or open, and replace.
	f) Ice Cube Guide	1. Out of position and ice trapped.	1. Place in position.
	g) Water Supply Line	1. Too small; requires 1/2" OD line dedicated per machine.	1. Increase water line size.
	h) Water Filter	1. Flow rate too small.	1. Replace with filter that has larger flow rate.

3. Low Ice Production

Problem	Possible Cause	Remedy
[1] Freeze cycle time is long.	a) See chart 1.[3] and check dirty air filter or condenser, ambient or water temperature, water pressure, condenser water regulating valve (water-cooled model), and refrigerant charge.	
	b) See chart 2.[1] and check float switch, inlet water valve and control board.	
	c) Check pump, hot gas valve, headmaster (C.P.R.) (remote air-cooled model), expansion valve, refrigeration check valve, and compressor.	
[2] Harvest cycle time is long.	a) See chart 2.[2] and check control board, thermistor, evaporator, ambient and/or water temperature, water supply line, inlet water valve, line valve, and gas valve.	

4. Abnormal Ice

Problem	Possible Cause		Remedy
[1] Small cubes.	a) Ice Cube Guide	1. Out of position. Circulated water falls into bin.	1. Place in position.
	b) See chart 1.[5] and check water supply line, inlet water valve, water system, pump motor, and control board.		
	c) Pump Out Check Valve	1. Dirty.	1. Clean.
[2] Cloudy or irregular cubes.	a) See chart 2.[1] and 2.[3], and check float switch, inlet water valve, control board, spray tubes, water system, refrigerant charge, and expansion valve.		
	b) Spray Guide	1. Dirty.	1. Clean.
	c) Water Quality	1. High hardness or contains impurities.	1. Install a water softener or filter.

5. Other

Problem	Possible Cause		Remedy
[1] Icemaker will not stop when bin is filled with ice.	a) Bin Control Thermostat	1. Set too cold.	1. Adjust warmer.
		2. Defective.	2. Replace
[2] Abnormal noise.	a) Pump Motor	1. Bearings worn out.	1. Replace
	b) Fan Motor	1. Bearings worn out.	1. Replace
		2. Fan blade deformed.	2. Replace fan blade.
		3. Fan blade does not move freely.	3. Replace.
	c) Compressor	1. Bearings worn out or cylinder valve broken.	1. Replace.
		2. Mounting pad out of position.	2. Reinstall.
	d) Refrigerant Lines	1. Rub or touch other lines or surfaces.	1. Replace.
[3] Ice in storage bin often melts.	a) Drain Line(s)	1. Plugged.	1. Clean.
	b) Icemaker and Bin	1. Drains not run separately.	1. Separate the drain lines.
	c) Ice Cube Guide	1. Out of position. Circulated water falls into bin.	1. Place in position.

V. Replacement of Components

⚠ WARNING

1. This unit should be diagnosed and repaired only by qualified service personnel to reduce the risk of death, electric shock, serious injury, or fire.
2. Move the control switch to the "OFF" position and turn off the power supply before servicing. Lockout/Tagout to prevent the power from being turned back on inadvertently.
3. **CHOKING HAZARD:** Ensure all components, fasteners, and thumbscrews are securely in place after the unit is serviced. Make sure that none have fallen into the storage bin.
4. Make sure all food zones in the icemaker and storage bin are clean after the unit is serviced. For cleaning procedures, see "VI. Cleaning and Maintenance Instructions."

A. Service for Refrigerant Lines

⚠ WARNING

1. Repairs requiring the refrigeration circuit to be opened must be performed by properly trained and EPA-certified service personnel.
2. Always recover the refrigerant and store it in an approved container. Do not discharge the refrigerant into the atmosphere.
3. Use an electronic leak detector or soap bubbles to check for leaks. Add a trace of refrigerant to the system (if using an electronic leak detector), and then raise the pressure using nitrogen gas (140 PSIG). DO NOT use R-404A as a mixture with pressurized air for leak testing.

CAUTION

1. Do not leave the system open for longer than 15 minutes when replacing or servicing parts. The Polyol Ester (POE) oils used in R-404A units can absorb moisture quickly. Therefore it is important to prevent moisture from entering the system when replacing or servicing parts.
2. Always install a new drier every time the sealed refrigeration system is opened.
3. Do not replace the drier until after all other repair or replacement has been made. Install the new drier with the arrow on the drier in the direction of the refrigerant flow.
4. When brazing, protect the drier by using a wet cloth to prevent the drier from overheating. Do not allow the drier to exceed 250°F (121°C).

1. Refrigerant Recovery

The icemaker is provided with refrigerant access valves. Using proper refrigerant practices, recover the refrigerant from the service valves and store it in an approved container. Do not discharge the refrigerant into the atmosphere.

2. Brazing

⚠ WARNING

1. R-404A itself is not flammable at atmospheric pressure and temperatures up to 176°F (80°C).
2. R-404A itself is not explosive or poisonous. However, when exposed to high temperatures (open flames), R-404A can be decomposed to form hydrofluoric acid and carbonyl fluoride both of which are hazardous.
3. Do not use silver alloy or copper alloy containing arsenic.
4. Use an electronic leak detector or soap bubbles to check for leaks. Add a trace of refrigerant to the system (if using an electronic leak detector), and then raise the pressure using nitrogen gas (140 PSIG). DO NOT use R-404A as a mixture with pressurized air for leak testing.

1) Braze all fittings while purging with nitrogen gas flowing at a pressure of 3 to 4 PSIG.
   Note: Because the pipes in the evaporator case are specially coated to resist corrosion, it is important to make connections outside the evaporator case when possible. If it is necessary to braze inside the evaporator case, use sandpaper to remove the coating from the brazing connections before unbrazing the components.

CAUTION

1. Always install a new drier every time the sealed refrigeration system is opened.
2. Do not replace the drier until after all other repair or replacement has been made. Install the new drier with the arrow on the drier in the direction of the refrigerant flow.
3. When brazing, protect the drier by using a wet cloth to prevent the drier from overheating. Do not allow the drier to exceed 250°F (121°C).

2) Use an electronic leak detector or soap bubbles to check for leaks. Add a trace of refrigerant to the system (if using an electronic leak detector), and then raise the pressure using nitrogen gas (140 PSIG). DO NOT use R-404A as a mixture with pressurized air for leak testing.

3. Evacuation and Recharge (R-404A)

1) Attach a vacuum pump to the system. Be sure to connect the charging hoses to both high and low-side access valves.

IMPORTANT

The vacuum level and vacuum pump may be the same as those for current refrigerants. However, the rubber hose and gauge manifold to be used for evacuation and refrigerant charge should be exclusively for POE oils.

2) Turn on the vacuum pump. Open the gauge manifold valves, then open the high and low-side access valves. Never allow the oil in the vacuum pump to flow backwards.

3) Allow the vacuum pump to pull down to a 29.9" Hg vacuum. Evacuating period depends on pump capacity.

4) Close the low-side valve and high-side valve on the gauge manifold.

5) Disconnect the gauge manifold hose from the vacuum pump and attach it to a refrigerant service cylinder. Remember to loosen the connection and purge the air from the hose. For refrigerant charge, see the rating label inside the icemaker. Hoshizaki recommends only virgin refrigerant or reclaimed refrigerant which meets ARI Standard 700 (latest edition) be used.

6) A liquid charge is required when charging an R-404A system (to prevent fractionation). Place the service cylinder on the scales; if the service cylinder is not equipped with a dip tube, invert the service cylinder, then place it on the scales. Open the high-side valve on the gauge manifold.

7) Allow the system to charge with liquid until the proper charge weight is met.

8) If necessary, add any remaining charge to the system through the low-side. **CAUTION! To prevent compressor damage, use a throttling valve or liquid dispensing device to add the remaining liquid charge through the low-side access valve with the unit running.**

9) Close the high and low-side gauge manifold valves, then disconnect the gauge manifold hoses.

10) Cap the access valves to prevent a possible leak.

B. Important Notes for Component Replacement

CAUTION

When replacing a component listed below, see the notes to help ensure proper operation.

Component	Notes
Compressor	Install a new start capacitor, run capacitor, and start relay.
Expansion Valve	• Attach the expansion valve bulb to the suction line in the same location as the previous bulb. • The bulb should be between the 10 and 2 o'clock positions on the tube. • Secure the bulb with the clamp and holder, then insulate it.
Hot Gas Valve Liquid Line Valve	• Replace the strainer when replacing the hot gas valve. • Use copper tube of the same diameter and length when replacing valve lines.
Fan Motor	Install a new capacitor.
Pump Motor	Install a new capacitor.
Thermistor	• Attach the new thermistor to the suction line in the same location as the previous thermistor. • The thermistor should be at the 12 o'clock position on the tube. • Smoothly fill the recessed area of the thermistor holder with high thermal conductive type sealant. Hoshizaki America part number 4A0683-01 (Silicone Heat Sink Compound 10-8108 manufactured by GC Electronics), KE-4560 RTV (manufactured by ShinEtsu Silicones), or equivalent are recommended. • Secure the thermistor with the holder, then insulate it. • Be very careful to prevent damage to the leads.

VI. Cleaning and Maintenance Instructions

A. Cleaning and Sanitizing Procedures

⚠ WARNING

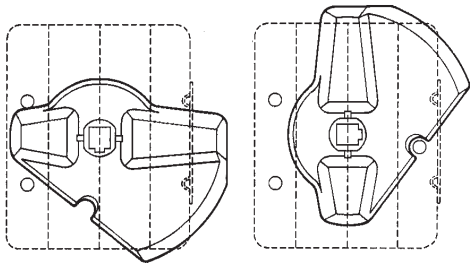
Ensure all components, fasteners and thumbscrews are securely in place after any maintenance or cleaning is done to the equipment.

⚠ WARNING

1. Hoshizaki recommends cleaning this unit at least once a year. More frequent cleaning, however, may be required in some existing water conditions.
2. To prevent injury to individuals and damage to the icemaker, do not use ammonia type cleaners.
3. Always wear liquid-proof gloves to prevent the cleaning and sanitizing solutions from coming into contact with skin.

CAUTION

1. The cleaning valve is used to allow solution flow to the inside of the evaporator during the cleaning and sanitizing operation. It should be closed for all icemaking operation. The compressor will not operate unless this valve is completely closed.
2. To open the cleaning valve, the valve handle should be parallel to the valve body. To close the valve, the valve handle should be at a right angle to the valve body.



CLOSED POSITION OPEN POSITION

1. Cleaning Procedure

1) Dilute 27 fl. oz. (800 ml) of Hoshizaki "Scale Away" with 5 gal. (19 l) of warm water.

2) Remove all ice from the evaporator and the storage bin.
   Note: To remove cubes on the evaporator, turn off the power supply and turn it on after 3 minutes. The harvest cycle starts and the cubes will be removed from the evaporator.

3) Turn off the power supply.

4) Remove the front panel and then remove the insulation panel by first removing the thumbscrew, lifting the panel slightly and pulling it toward you.

5) Drain the water tank by removing the rubber cap covering the overflow pipe in the water tank. Remove the overflow pipe by turning it counterclockwise. See Fig. 3.

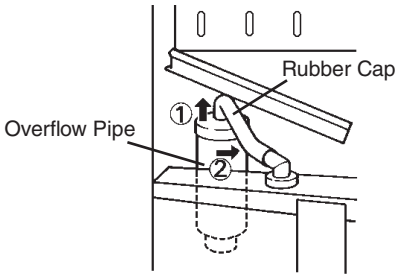


Fig. 3

6) Replace the removed parts in their correct positions.

7) In bad or severe water conditions, clean the float switch assembly as described below. Otherwise, continue to step 8.
   a. Remove the float switch assembly from the mounting bracket and remove the rubber boot from the bottom of the assembly.
   b. Remove the retainer rod from the bottom of the float switch assembly, then remove the float. Be careful not to bend the retainer rod excessively when removing it.
   c. Wipe down the float switch assembly's housing, shaft, float, and retainer rod with cleaning solution. Wipe the inside of the rubber boot with cleaning solution.
   d. Reassemble the float switch assembly and replace it and the rubber boot in their correct positions.

8) Pour the cleaning solution into the water tank.

9) Fully open the cleaning valve on the left side wall of the machine compartment.

10) Move the control switch (on the control box) to the "WASH" position.

11) Replace the insulation panel and the front panel in their correct positions.
   Note: When replacing the insulation panel, do not catch the hose between the panel and the body.

12) Turn on the power supply and start the washing process.

13) Turn off the power supply after 30 minutes.

14) Remove the front panel and the insulation panel.

15) Drain the water tank. (See step 5 above). Replace the removed parts and the insulation panel in their correct positions.

16) Move the control switch to the "ICE" position.

17) Close the cleaning valve.
Note: The icemaker will not operate unless the cleaning valve is completely closed.

18) Replace the front panel in its correct position.

19) Turn on the power supply to fill the water tank with water.

20) Turn off the power supply after 3 minutes.

21) Remove the front panel and fully open the cleaning valve.

22) Move the control switch to the "WASH" position.

23) Replace the front panel in its correct position.

24) Turn on the power supply to rinse off the cleaning solution.

25) Turn off the power supply after 5 minutes.

26) Remove the front panel and insulation panel.

27) Drain the water tank. (See step 5 above.) Replace the removed parts and the insulation panel in their correct positions.
Note: Do not replace the insulation panel when you proceed to "2. Sanitizing Procedure."

28) Repeat steps 16 through 27 three more times to rinse thoroughly.
Note: If you do not sanitize the icemaker, go to step 9 in "2. Sanitizing Procedure."

2. Sanitizing Procedure - Following Cleaning Procedure

1) Dilute a 5.25% sodium hypochlorite solution (chlorine bleach) with water. (Add 2.5 fl. oz. (74 ml) of sanitizer to 5 gal. (19 l) of water).

2) Pour the sanitizing solution into the water tank.

3) Replace the insulation panel and the front panel in their correct positions.
Note: Make sure that the control switch is in the "WASH" position and the cleaning valve is open.

4) Turn on the power supply, and start the sanitizing process.

5) Turn off the power supply after 15 minutes.

6) Remove the front panel and the insulation panel.

7) Drain the water tank. See step 5 in "1. Cleaning Procedure." Replace the removed parts and the insulation panel in their correct positions.

8) Repeat steps 16 through 27 in "1. Cleaning Procedure" two times to rinse thoroughly.

9) Close the cleaning valve.

10) Move the control switch to the "ICE" position.

11) Replace the front panel in its correct position.

12) Clean the storage bin with water.

13) Turn on the power supply and start the automatic icemaking process.

B. Maintenance

IMPORTANT

This icemaker must be maintained individually, referring to the instruction manual and labels provided with the icemaker.

1. Stainless Steel Exterior

To prevent corrosion, wipe the exterior occasionally with a clean and soft cloth. Use a damp cloth containing a neutral cleaner to wipe off oil or dirt build up.

2. Storage Bin and Scoop

- Wash your hands before removing ice. Use the plastic scoop provided.
- The storage bin is for ice use only. Do not store anything else in the bin.
- Keep the scoop clean. Clean it by using a neutral cleaner and rinse thoroughly.
- Clean the bin liner by using a neutral cleaner. Rinse thoroughly after cleaning.

3. Condenser

Check the condenser once a year, and clean if required by using a brush or vacuum cleaner. More frequent cleaning may be required depending on the location of the condenser unit.

C. Preparing the Icemaker for Long Storage

⚠ WARNING

When shutting off the icemaker for an extended time, drain out all water from the water tank and remove the ice from the storage bin. The storage bin should be cleaned and dried. Drain the icemaker to prevent damage to the water supply line at subfreezing temperatures, using air or carbon dioxide. Shut off the icemaker until the proper ambient temperature is resumed.

Note: When the icemaker is not used for two or three days, it is sufficient to only move the control switch to the "OFF" position, unless the icemaker will be at subfreezing temperatures.

1. Remove the water from the potable water supply line:

1) Remove the front panel.
2) Move the control switch (on the control box) to the "OFF" position.
3) Wait 3 minutes.
4) Close the potable water supply line shut-off valve and open the potable water supply line drain valve.
5) Allow the line to drain by gravity.

6) Attach compressed air or carbon dioxide supply to the potable water line drain valve.

7) Move the control switch to the "ICE" position.

8) Blow the potable water line out using compressed air or carbon dioxide.

2. Drain the potable water tank:

1) Turn off the power supply.

2) Move the control switch to the "OFF" position.

3) Drain the water tank by removing the insulation panel and the rubber cap covering the overflow pipe in the water tank. Remove the overflow pipe by turning it counterclockwise. See Fig. 4.

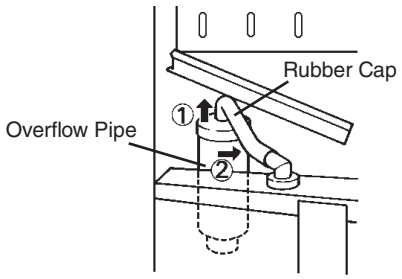


Fig. 4

4) Replace the removed parts in their correct positions.

5) Remove all ice from the storage bin, and clean the storage bin.

6) Replace the front panel in its correct position.

7) Close the drain valve.